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FAB 49

EGGS & POULTRY MEAT

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H. J. BROOKES  
EDITOR



# EGGS

1

[Quality and foaming characteristics of eggs of various hen strains and storage conditions.] Die Qualität und insbesondere das Schaumbildungsvermögen von Eiern aus unterschiedlichen Herkünften und Lagerungsbedingungen.

Scholtysek, S.; El-Bogdady, A.

*Archiv für Geflügelkunde* 44 (2) 79-87 (1980) [11 ref.  
De, en, fr, ru] [Lehrstuhl Kleintierzucht, Univ.  
Hohenheim, 7000 Stuttgart 70, Federal Republic of  
Germany]

Studies were conducted on eggs laid by 4 hen strains (2 producing brown-shelled and 2 producing white-shelled eggs) stored for 2, 9, 16, 23 or 30 days at 5° or 19°C. Characteristics studied were wt. loss during storage, albumen height, yolk index, albumen %, yolk %, albumen pH, DM concn. in the albumen, foaming index, foam stability, separation of liquid albumen from the whipped albumen foam after holding for 1 h, and the pH and DM content of the liquid albumen separated from the foam. Tables of results are given, and the significance of effects of hen strain, storage time and storage temp. (and their interactions) on quality characteristics is discussed. Correlations between the quality characteristics studied are also presented. Effects of hen strain and storage conditions on the concn. of various protein fractions (albumin 1, albumin 2, ovomucoid, ovoglobulin, conalbumin, lysozyme) in the albumin were also studied; tables and graphs of results are given, together with correlations of protein fraction concn. with foam index and foam stability. Hen strain influenced albumen height, albumen and yolk %, DM concn. in the albumen, liquid albumen separation, and foam stability. Storage time influenced all the egg characteristics studied. Storage temp. influenced all except foam index and albumen and yolk %. Concn. of most protein fractions (except lysozyme) was influenced by all 3 variables studied; storage temp. had no effect on concn. of albumin 1. Correlations between protein fraction concn. and foaming characteristics were low. AJDW

2

[Effects of cage type and population density on the performance of hens of various strains.] Käfigform und Besatzdichte in ihrer Auswirkung auf die Leistung unterschiedlicher Legehennenherkünfte.

Scholtysek, S.

*Archiv für Geflügelkunde* 44 (3) 104-111 (1980) [8 ref.  
De, en, fr, ru] [Lehrstuhl Kleintierzucht, Univ.  
Hohenheim, 7000 Stuttgart 70, Federal Republic of  
Germany]

1252 laying hens of 3 strains (Hisex, LSL, Shaver) were used in 2 studies on effects of population density (3, 4 or 6 birds/cage), cage depth (35, 40 or 55 cm) and position of the cage in a 3-level stack on laying performance and egg quality. Tables of results are given. The results show % cracked eggs to be significantly influenced by hen strain (Shaver better than the other 2), population density (6/cage worse than

3 or 4/cage) and level of the cage in the stack (top level worse than lower 2 levels). Cage depth had little effect on % cracked eggs. Data are also given showing effects of hen strain and age on egg wt., breaking strength, elastic deformation, yolk colour, albumen height, and yolk index: significant differences between hen strains and ages were observed for all these characteristics. AJDW

3

[Dehydration of eggs.] [Review]

Aguirre, J. M. de; Travaglini, D. A.; Silveira, E. T. F. *Boletim do Instituto de Tecnologia de Alimentos, Brazil* 16 (3) 261-287 (1979) [16 ref. Pt, en] [Inst de Tecnologia de Alimentos, Campinas, São Paulo, Brazil]

Aspects considered in this review on dehydration of whole egg, egg yolk and egg albumen include: raw materials; washing the eggs; breaking; separation of yolk and albumen; filtration; cooling; fermentation to reduce glucose content, by means of yeasts, bacteria or enzymes; pasteurization (by batch methods, or a continuous HTST method); concentration of the liquid egg; drying methods (pan-, spray-, freeze- or foam-drying); types of dried egg product; composition of dried egg products; nutritional value; functional properties; and microbiological quality. AJDW

4

[Effects of dietary energy and protein supply on the chemical composition of hens' eggs.] Zum Einfluss unterschiedlicher Energie- und Proteinversorgung auf die chemische Zusammensetzung von Hühnereiern.

Kirchgessner, M.; Voreck, O.

*Archiv für Geflügelkunde* 44 (3) 89-94 (1980) [14 ref.  
De, en, fr, ru] [Inst für Ernährungsphysiol., Tech. Univ.  
München, Freising-Weihenstephan, Federal Republic of  
Germany]

96 HNL hens were used in a 40-day feeding trial conducted to evaluate effects of dietary energy intake (930, 1100, 1270 or 1440 kJ/day) and protein intake (14.3, 17.6, 21.2 and 24.5 g/day) on egg quality. Tables of data are given for % shell in the whole egg, and protein, fat, DM and energy contents of the yolk + albumen. The results show that both protein and energy intakes significantly influenced shell % in the egg and protein, fat and energy contents of the yolk + albumen, but not DM concn. in the yolk + albumen. A significant energy intake × protein intake interaction was observed only for energy content of the yolk + albumen. Correlations between various egg characteristics and indices of laying performance are also presented. AJDW

5

Rapeseed meal in rations for laying hens: a review of the effect on egg quality. [Review]

Fenwick, G. R.; Curtis, R. F.

*Journal of the Science of Food and Agriculture* 31 (6) 515-525 (1980) [91 ref. En] [Agric. Res. Council, Food Res. Inst., Colney Lane, Norwich NR4 7UA, UK]

The current role of rapeseed meal (RSM) as a source of protein for laying hens is discussed. Advantages of the use of meal from low glucosinolate rapeseed cv. are emphasized. The effect of inclusion of RSM in layer

rations on egg quality is discussed with special reference to the problem of the fishy egg taint which occurs in the eggs of certain breeds of laying hen. The current understanding of the problem is outlined and potential solutions are offered, based upon plant and avian genetic manipulation or chemical treatment of the rapeseed meal. AS

## 6

[Studies on induction of laying pauses by means of Zn-rich diets.] Untersuchungen zur Einleitung von Legepausen mit zinkreichen Rationen.

Bessei, W.; Lantzsch, H.-J.

*Archiv für Geflügelkunde* 44 (3) 133-140 (1980) [15 ref. De, en, fr, ru] [Lehrstuhl Kleintierzucht, Univ. Hohenheim, 7000 Stuttgart 70, Federal Republic of Germany]

Groups of 5-yr-old White Leghorn hybrid laying hens were used in a study on use of high dietary Zn concn. (5000, 10 000, 15 000 or 20 000 p.p.m. for 2, 4, 6 or 8 days) for induction of laying pauses. Tables of data are given, showing effects on laying performance, egg wt., breaking strength, albumen height, and Zn concn. in the albumen + yolk. Efficacy of induction of a laying pause increased with increasing dietary Zn concn. and duration of application of the high-Zn diet. Little effect of the high-Zn diets on egg quality was observed. The max. Zn concn. detected in eggs laid by treated hens (54.0 p.p.m.) was too low to present a health hazard to humans consuming the eggs. AJDW

## 7

[Effect of  $Hg^{2+}$  levels in broiler and laying hen diets on performance of the birds and residues in tissues and eggs.] Der Einfluss von Quecksilber-( $Hg^{2+}$ )-Zusätzen zum Broiler- und Legehennenfutter auf die Leistungen der Tiere und auf Rückstandsgehalte in den Geweben und den Eiern.

Nezel, K.; Vogt, H.

*Archiv für Geflügelkunde* 44 (2) 41-47 (1980) [10 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Bundesforschungsanstalt für Landwirtschaft, Braunschweig-Völkenrode, 3100 Celle, Federal Republic of Germany]

A 50 day broiler feeding trial with diets containing 0, 1, 2, 5, 10, 20 or 40 p.p.m. Hg as mercuric acetate and a 280 day laying hen feeding trial with diets containing 0, 0.5, 1 or 2 p.p.m. Hg as mercuric acetate are described. Tables of data are given for performance of the birds, shell quality of eggs laid by the hens, and residue carry-over into the tissues (feathers, thigh and breast muscle, liver, kidneys, bone, skin and fat) and the egg albumen, yolk and shell. The results are discussed in detail. The dietary Hg concn. studied had little effect on performance of the broilers or hens, but impaired shell quality of the eggs. Hg concn. in broiler tissues increased linearly with increasing dietary Hg concn. Half-lives of Hg in tissues after withdrawal of dietary Hg are given. Kidneys and liver had the highest Hg uptake of the tissues studied. Max. Hg concn. in egg yolk was 0.2 p.p.m. (for hens receiving the 2 p.p.m. Hg diet); Hg concn. in the yolk decreased rapidly after withdrawal of dietary Hg. AJDW

## 8

[Use of *Eleutherococcus* root extract in poultry feed.] Der Einsatz von *Eleutherococcus*-Wurzelextrakt im Geflügelfutter.

Vogt, H.

*Archiv für Geflügelkunde* 44 (2) 67-70 (1980) [7 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Forschungsanstalt für Landwirtschaft Braunschweig-Völkenrode, 3100 Celle, Federal Republic of Germany]

Studies on use of an extract of the root of *Eleutherococcus senticosus*, which is included in the Soviet pharmacopoeia, in poultry feed are described. Dietary levels of 0 and 0.2% *E. senticosus* root extract were used in a 140-day feeding trial on Japanese quails, and levels of 0, 0.2 and 0.4% *E. senticosus* root extract were used in a 322-day feeding trial with White Leghorn laying hens. Tables of results are given, including values for growth rate and laying

performance of the quails, and laying performance and egg quality of the hens. Eggs laid by the hen group receiving the highest level of *E. senticosus* root extract tended to have lower % cracking, lower albumen index and lower reflectance value than those laid by the other 2 groups. AJDW

## 9

[Heavy metal content of hen eggs.] Zum Schwermetallgehalt von Hühnereiern.

Weigert, P.

*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 171 (1) 18-19 (1980) [9 ref. De, en] [Vet.-Untersuchungsstelle der Bundeswehr VI, Schleissheimer Strasse 416, D-8000 München 45, Federal Republic of Germany]

Heavy metal contents of hen egg yolk, white and shell (75 eggs) were determined, after freeze-drying of samples followed by wet digestion, by AAS. Moisture contents of egg white and yolk were 88% and 49%, resp. Mean contents and s.d. (in parenthesis) in yolks

and whites, resp. were (p.p.m. dry wt.) Pb 0.067 (0.088), 0.085 (0.088); Cd 0.028 (0.049), 0.023 (0.023); Hg 0.006 (0.004), 0.005 (0.002); As 0.348 (0.316), 0.209 (0.180); Se 0.567 (0.544), 0.376 (0.388). No correlations were found between individual metals or between egg components. Systematic monitoring of contents of As, Se and Cd in eggs is recommended. DIH

## 10

[Pesticides of DDT and HCH types in raw materials and products of the poultry industry. V.]

Lukacka, J.; Lisa, V.

*Hydinarsky Priemysel* 21 (9/10) 341-350 (1979) [3 ref. Sk] [Vyskumný Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

A study of the levels of organochlorine pesticides in lipids of poultry and eggs, carried out during the past yr, showed no significant differences between contamination of duck and goose fat by organochlorine insecticides of the HCH or DDT type. Long term control analyses showed that even the max. values found for lindane residues never exceeded 0.7 mg/kg of fat. STI

11

[Nutritional/physiological significance of eggs and poultry meat.] Die ernährungsphysiologische Bedeutung von Eiern und Geflügelfleisch.

Proll, J.

*Ernährungsforschung* 25 (1) 20-24 (1980) [De]

[Zentralinst. für Ernährung, Potsdam-Rehbrücke, German Democratic Republic]

Tables of data are given for the composition (protein, fat, carbohydrate, vitamins, cholesterol, minerals and moisture) of eggs and poultry meat, and for consumption of eggs and poultry meat in the German Democratic Republic over the period 1955-1977. It is concluded that eggs and poultry meat are high quality, easily digestible and assimilable foods, and are especially valuable sources of protein. Increased consumption of broiler and turkey meat in place of fat-rich meats is recommended. Per capita consumption of eggs should not exceed the present level, because of the relatively high concn. of cholesterol. IN

12

[Container for eggs.]

ONO

*French Patent Application* 2 427 272 (1979) [Fr]

A variant of the standard rectangular plastics box for carrying 6 eggs is described in which the eggs rest in depressions in the lower half and the upper half has indentations which fit round the upper part of the eggs.

W&Co

13

Comparative effects of barley feed and sodium selenite on selenium levels in hen eggs and tissues.

Kääntee, E.; Kurkela, P.

*Journal of the Scientific Agricultural Society of Finland* 52 (4) 357-367 (1980) [17 ref. En, fi] [66270 Pörtom, Finland]

An investigation was carried out into the effects of barleys with varying levels of Se (due to fertilizer application during cultivation), and of sodium selenite, on the Se content of organs in laying hens, including breast muscle, and in the yolks and whites of their eggs. 6 groups of hens were fed the trial feed mixtures, and after 28 days 6 hens from each group were slaughtered and samples of tissues taken for Se determination. Se concn. ( $\mu\text{g}/\text{kg DM}$ ) in hen muscle ranged from  $112 \pm 39$  to  $575 \pm 155$  for the 6 groups. Se content ( $\mu\text{g}/\text{kg DM}$ ) of eggs at the beginning of the trial was found to be  $85 \pm 36$ . Thereafter the Se concn. increased rapidly in groups 2-6, stabilizing at the level of wk 4. Se content ( $\text{mg}/\text{kg}$ ) of white, yolk and whole egg resp. of groups 2-6 after 28 days, ranged:  $63 \pm 27$  to  $423 \pm 75$ ;  $330 \pm 73$  to  $898 \pm 49$ ;  $160 \pm 26$  to  $588 \pm 22$ . Results show that the Se content of feed and organs correlate logarithmically. Variations in grain Se caused similar changes in Se level of both egg yolk and white, sodium selenite primarily affected the yolk Se level. VJG

14

Effects of sodium plus potassium to chloride ratio in practical-type diets on blood gas levels in three strains of White Leghorn hens and the relationship between acid-base balance and egg shell strength.

Hamilton, R. M. G.; Thompson, B. K.

*Poultry Science* 59 (6) 1294-1303 (1980) [26 ref. En]

[Anim. Res. Inst., Res. Branch, Agric. Canada, Cent. Exp. Farm, Ottawa, Canada K1A 0C6]

Hens were fed 1 of 6 diets containing different ratios of  $(\text{Na} + \text{K})/\text{Cl}^-$ . Measurements of physiological factors and determinations of egg shell strength parameters and interior egg quality showed that there was a significant difference between strains of hen with respect to egg and shell wt., % shell, shell wt/unit surface area and egg sp. gr. Although the acid/base balance of the laying hens was altered by the different diets, no relationship was found between this and egg shell strength. JRR

15

[Effect of battery keeping of layers on egg quality.]

Chmelnicna, L.

*Pol'nohospodarstvo* 25 (6) 517-523 (1979) [9 ref. Sk, en, ru] [Katedra Hydinarstva & Zool., Vysoka Skola Pol'nohospodarska, 949 67 Nitra, Czechoslovakia]

Incidence of sub-standard eggs in (i) flat-deck and (ii) 3-tier battery housing of layers was studied during an egg-laying cycle. Mean values with ranges and s.e. are tabulated for % of eggs rejected because of contamination with dirt, droppings, blood, or egg contents; and because of deformation, double-yolk, slight cracks and major cracks. The overall incidence of non-standard eggs was  $13.71 \pm 1.19\%$  in (i) and  $12.97 \pm 1.50\%$  in (ii); the difference was not significant. Similar tabulation of unusable eggs shows incidences of eggs  $<35\text{ g}$  in wt., without shell, and broken eggs; the totals were  $2.85 \pm 0.29$  and  $2.75 \pm 0.35\%$  of daily production, broken eggs forming 91.9 and 75.6% resp. of unusable totals. The (ii) procedure is recommended. SKK

16

[Methods for routine determination of activity of  $\alpha$ -amylase in liquid whole egg.]

Cattaneo, P.; Cantoni, C.; Rozzoni, C.

*Industria Alimentari* 19 (4) 313-315, 320 (1980) [18 ref. It, en]

The method of Shrimpton et al. [see *Journal of Hygiene* (1962) 60, 153], the official Italian method for detn. of  $\alpha$ -amylase activity in liquid whole egg, has given wide inter-laboratory variations in results. Comparative tests were therefore carried out with the Amylochrome method (Roche) which employs an amylose substrate bound to a dye, which produces a blue colour in the presence of  $\alpha$ -amylase. Analysis of samples of raw bulk eggs stored at 2-4°C for 1-16 days, and of mixtures of raw and pasteurized showed that the Amylochrome was more sensitive than the official method, and gave reliable results. HBr

17

**Study of vacuum oven drying in official method for moisture in eggs and egg products.**

Taber, L. E.

*Journal of the Association of Official Analytical Chemists* 63 (4) 941-942 (1980) [En] [Seymour Foods, Inc., 101 N. Kansas Avenue, Topeka, Kansas 66601, USA]

Discrepancies occur when moisture or solids detn. on eggs and egg products are done by the vacuum oven method as opposed to the atmospheric oven method. The vacuum oven method requires a temp. of 100°C to a point of constant wt. (about 5 h) at 25 mm Hg. When compared with the same samples dried to constant wt. in an atmospheric oven at 100°C the vacuum dried product will show a 10-50% greater loss of wt. depending on carbohydrate content. The difference in the product colour from the 2 drying methods indicates a carbohydrate reaction in the vacuum dried product.

AS

18

[Protein supplementation of certain foods by eggs.]

Kadas, J.; Polya, M.

*Baromfitenyesztes es Feldolgozas* 27 (1) 21-25 (1980) [5 ref. Hu] [Kereskedelmi & Vendeglatoiipari Föiskola, Budapest, Hungary]

In Hungary, 60% of the energy requirement of the population is supplied by consumption of cereals. Because a high proportion of the protein intake is supplied by wheat flour, which is relatively poor in lysine, it is desirable to supplement this deficiency by the addition of eggs. According to FAO/WHO only 42% of the amino-acids in wheat flour is adequately balanced for human consumption. By adding eggs this proportion can be considerably increased. The addition of eggs can similarly increase the nutritional values of vegetables such as spinach, carrots, peas and cabbage, which are relatively poor in the S-containing amino-acids, isoleucine and tryptophan. ESK

19

[Detection and determination of 2,2-bis-(4-chlorophenyl)-1,1-dichloroethylene (DDE) in hens' eggs by HPLC.]

Gandini, C.; Caccialanza, G.; Borgna, P.

*Farmaco, Edizione Pratica* 35 (3) 141-146 (1980) [1 ref. It, en] [Univ. di Pavia, Pavia, Italy]

An analytical method was developed for routine detn. of DDE in eggs by HPLC, detection limit 5 ng, mean recovery from 0.1-5.0 p.p.m. 97.68% (96.00% for 0.1, 98.00% for 0.5 p.p.m. added DDE). The method may be more generally applicable for detn. of organochlorine pesticide residues in various products. RM

20

Rapeseed meal and egg taint. (In 'Proceedings. 5th International rapeseed conference. Vol. II.' [see FSTA (1981) 13 2N47]) [Lecture]

Curtis, F.; Fenwick, R.; Heaney, R.; Hobson-Frocock, A.; Land, D.

2, 300-302 (1979) [6 ref. En] [ARC Food Res. Inst., Norwich, UK]

Hens laying brown eggs cannot be fed rapeseed meal as it causes 'fishy' taints in approx. 10% of the eggs. 'Crabby' odour has been related to trimethylamine (THA) at levels  $\geq 1 \mu\text{g/g}$ . To study the factors involved THA was sublimated from frozen (-198°C) whole egg under vacuum, and gas chromatography of the frozen distillate showed changes in THA levels in eggs from susceptible hens fed control or rapeseed diets. All rapeseed meals, from Span P, Yellow Sarson, Altona and Bronowski, caused increased THA levels independent of glucosinolate values. Rapeseed meal was separated into active (taint-producing) and inactive fractions by defatting and 11% acetone extraction. The active extract was freeze-dried and partitioned between methanol and chloroform to give an active polar fraction which was passed through an Amberlite cation exchange resin, producing an inactive effluent. Chemical compounds absorbed on the resin include chlorine derivatives, mainly sinapine which restored activity to the effluent, but seemed to act alongside other factors in the meal. Zero-sinapine lines of rapeseed may need to be bred, or commercial reduction of levels done by  $\text{Ca}(\text{OH})_2$  extraction. As only certain birds are susceptible it may be possible to breed resistant var. of birds. Studies have shown that tainters oxidize THA badly and sinapine seems to inhibit THA-oxidase in vitro. LH

21

The effect of adding soybean or rapeseed gums to the diet on the performance of laying hens. (In 'Proceedings. 5th International rapeseed conference. Vol. II.' [see FSTA (1981) 13 2N47]) [Lecture]

Hulan, H. W.; Proudfoot, F. G.

2, 295-299 (1979) [6 ref. En] [Agric. Canada, Res. Sta., Kentville, Nova Scotia, Canada]

Soybean gums (SBG) or rapeseed gums (RSG) were added at 2% levels to practical layer diets of 2 genotypes of Single Comb White Leghorn laying hens to study effects on mortality and performance. Factors examined were: (i) feed intake, (ii) mortality, (iii) age at 50% production, (iv) mean hen housed egg production, (v) feed efficiency, (vi) individual body wt., (vii) egg wt., (viii) egg sp. gr., (ix) Haugh units and (x) yolk colour.

Genotypic differences were noted in (ii)-(viii). (ii) was higher in gum-fed hens, especially SBG-fed hens, than in control hens (no gum in diet). Fatty liver syndrome was diagnosed. (iii) and (iv) were not diet-sensitive, (v) was lowered by gums and (vi) was heightened as was (vii) at the end of the test period. (viii) varied throughout the experiment, hens fed RSG having initially weaker then stronger shells than the others. (ix) was not affected by dietary treatment, though (x) was deeper in SBG-fed hens during the latter part of the experiment. Heart and liver wt. differed with genotype but thyroid wt. did not, and was not altered by diet. RSG-fed hen hearts were lighter than the others, as were livers of hens fed either gum. Higher levels of gums have a deleterious effect on performance. LH

**Electrical energy used and time consumed when cooking foods by various home methods: eggs.**

Baker, R. C.; Darfler, J. M.; Rehkugler, G. E.

*Poultry Science* 59 (3) 545-549 (1980) [11 ref. En] [Dep. of Poultry Sci., Cornell Univ., Ithaca, New York 14853, USA]

Eggs were cooked by various home style methods in order to determine which methods were more economical of energy. Electrical energy consumed was measured by a watt meter. Eggs were cooked by: soft and hard boiling; scrambling (top stove and microwave); frying; poaching; omelettes; and oven baked (shirring). Energy-saving methods were those which reduced heat losses by taking advantage of: the heat stored in water (hard boiled); the heat saved by covering the utensil (fried eggs, covered); or equipment which used less water to accomplish the same results (poaching eggs in egg poacher). AS

**[Lucerne juice protein concentrate in diets for laying hens.]**

Korniewicz, A.; Mazanowska, A.; Gwara, T.

*Roczniki Naukowe Zootechniki, Monografie i*

*Rozprawy* No. 16, 63-76 (1980) [20 ref. Pl, en, ru] [Cent. Sta. Oceny Pasz, 55-011 Siechnice, Poland]

240 laying hens were used in a 6-month feeding trial conducted to evaluate effects of partial replacement of dietary soybean meal by lucerne juice protein concentrate (LJPC) on laying performance and egg quality. 4 diets were tested, containing 0, 6, 12 or 17% LJPC. Tables of results are given, including data for egg wt., the wt. and % of yolk, albumen and shell, the DM and protein content of the albumen, the DM, protein, fat, vitamin A and carotenoid contents of the yolk, and the Ca, P and Mg contents of the shell. The results show that albumen wt., protein and carotenoid contents of the yolk and the Mg content of the shell increased with increasing dietary LJPC level; DM and protein contents in the albumen were higher for the 0% and 17% LJPC diets than for the diets with intermediate LJPC levels. AJDW

**[Apparatus for preserving eggs and method for its manufacture.]**

France-Pointe

*French Patent Application* 2 427 791 (1980) [Fr]

Shelled hard-boiled eggs may be kept for  $\geq 5$  wk without blackening of the yolk or discoloration of the white if they are sealed in a container in presence of an inert gas consisting mainly of  $\text{CO}_2$  at normal atmospheric pressure. Additives may be included to improve the flavour. W&Co

**[Krill meal in diets for laying hens.]**

Korniewicz, A.; Gwara, T.; Mazanowska, A.; Kaczmarek, K.

*Roczniki Naukowe Zootechniki, Monografie i*

*Rozprawy* No. 16, 103-117 (1980) [17 ref. Pl, en, ru]

[Inst. Zootech., Cent. Sta. Oceny Pasz, 55-011 Siechnice, Poland]

208 New Hampshire laying hens were used in a study on effects of full or partial substitution of krill meal for fish meal + meat/bone meal on the laying performance, egg quality, carcass and meat quality. 4 diets were tested, in which krill meal was substituted for none,  $\frac{1}{3}$ ,  $\frac{2}{3}$  or all of the fish meal + meat/bone meal. Tables of results are given, including data for egg wt., the wt. and % of yolk, albumen and shell, composition of the yolk, albumen and shell, slaughter wt., % liver, % breast muscle, % abdominal fat, pH, water absorption capacity of the meat, vitamin A content of the liver, and refractive index of the fat. The results show no significant effect of diet on egg quality. Meat pH tended to increase and vitamin A content of the liver tended to decrease with increasing krill meal content in the diet. Meat from birds fed all 3 krill meal-containing diets had lower ash contents than that from birds fed the control diet. AJDW

**[Process for preserving eggs.]**

Emel'yanov, B. V.; Krivopishin, I. P.

*USSR Patent* 730 335 (1980) [Ru]

To increase the storage life and retain the nutritional and flavour properties, a protective film is applied by successively immersing and soaking the eggs in an aqueous solution containing 2.5-5%  $\text{H}_2\text{O}_2$  for 5-7 min, and an aqueous suspension of  $\text{Ca}(\text{OH})_2$ . W&Co

**Salmonellae recovery following oral and intravenous inoculation of laying hens.**

Baker, R. C.; Goff, J. P.; Mulnix, E. J.

*Poultry Science* 59 (4) 1067-1072 (1980) [12 ref. En] [Dep. of Poult. Sci., Cornell Univ., Ithaca, New York 14853, USA]

White Leghorn hens were inoculated with *Salmonella typhimurium* either orally or intravenously, in the basal vein of the wing. No contamination of the shell, yolk or albumen of eggs laid by inoculated hens was observed, although *Salm. typhimurium* was excreted in the faeces by birds inoculated orally. AJDW

**[Correlation between egg yolk and albumen properties during the egg-laying cycle.]**

Halaj, M. ..

*Pol'nohospodarstvo* 25 (2) 196-200 (1979) [10 ref. Sk, en, ru] [Katedra Hydinarstva & Zool., Vysoka Skola Pol'nohospodarska, 949 67 Nitra, Czechoslovakia]

60 eggs each were collected at 4-wk intervals

between the ages of 24 and 64 wk from 6 commercial hybrid Leghorn-type layers and 2 hybrids laying brown eggs; albumen wt., thick albumen height, mean albumen diam., yolk wt., yolk height and yolk diam. were measured, and albumen and yolk indices (% ratios of height to diam.), and Haugh units (relating albumen height to egg wt.) were calculated. Correlation coeff. between albumen wt. and other albumen characteristics and between yolk wt. and other yolk characteristics are tabulated for all variants, and changes during the egg-laying cycle are discussed. SKK

## 29

### [Characteristics of eggs with white and coloured shells.]

Rodrigues, P. C.; Lima, J. N. F.; Andrade, A. N.  
*Cientifica* 7 (2) 291-295 (1979) [10 ref. Pt, en] [Dep. de Zootecnia da Fac. de Vet., Univ. Federal Fluminense, Fluminense, Sardinia]

The authors conducted an experiment with a factorial design using eggs with white and coloured shells, which were submitted to 2 different storage conditions (room temp. and cold room at 15°C and 85% RH for 24 days.) The following characteristics were studied: wt. of the eggs, thickness and porosity of the shells and albumen quality (Haugh units). The results indicated that, independently of shell colour, the eggs were of better quality when kept at low temp. The differences were statistically significant when the Tukey test was applied ( $P > 0.05$ ). It was concluded that eggs for consumption must be kept under refrigeration for max. retention of quality. AS

## 30

### [Fluorimetric method for determination of oxytetracyclines in biological material and some foods of animal origin.]

Regosz, A.; Czerwinska, B.  
*Bromatologia i Chemia Toksykologiczna* 13 (1) 13-18 (1980) [9 ref. Pl, en, ru] [Zaklad Chem. Anal. Inst. Chem. & Anal. Akad Med., Gdansk, Poland]

The method involves isolation of the antibiotic with 0.1N HCl, conversion to a fluorescent complex with calcium and barbitone, extraction with *n*-butanol, and quantitative detn. by fluorimetry. The method was applied to spiked samples of pig's kidneys, pork, hen's liver and kidneys, and eggs. Sensitivity of the method was 0.15 µg/g, precision within 85-95%, and mean recovery 32-91%. The results agreed well with standard biological tests. HBr

## 31

### Overview on the chemical deteriorative changes of proteins and their consequences. [Lecture]

Feeney, R. E.

*ACS Symposium Series* 123, 1-47 (1980) [66 ref. En] [Dep. of Food Sci. & Tech., Univ. of California, Davis, California 95616, USA]

Protein deteriorations occur widely in almost every biological system, whether dead or alive, including in the storage and handling of food products. The subject is covered in general and aspects discussed in more detail include problems with chicken egg-white

ovotransferrin, Maillard reaction in dried egg, undesirable chemical products formed in the processing of foods and feeds, chemical deterioration to purposely derivatize proteins, etc. Further work is needed to understand the protein deteriorations in living systems, the post-harvest and post-slaughter changes that occur in plant and animal materials used for food and feed, and methods for detection, characterization, quantitation and purification of deteriorated proteins. [See FSTA (1981) 13 3A110.] AL

## 32

### [Cleaning agent for cleaning food and feedstuffs.]

Reinigungsmittel zum Reinigen von Nahrungs- und Futtermitteln.  
Lehmann, H.-J.; Bietz, R.; Wegner, J. (Henkel KGaA)

*German Federal Republic Patent Application*

2 745 371 (1979) [De]

An aqueous concentrate for cleaning foodstuffs of vegetable or animal origin consists of 0.1-10% water soluble or dispersible protein, 0.01-3% water-soluble polymers, 1-15% sequestrants, and 0.01-1% preservatives and auxiliary products. The product is used in dilute aqueous solution particularly for cleaning fruit and vegetables but also for meat, fish, eggs, cheeses etc. It is free of surfactants and does not foam much or cause skin irritation. W&Co

## 33

### Proceedings, 1979 Georgia Nutrition Conference for the Feed Industry. [Conference proceedings]

United States of America, University of Georgia; United States of America, Georgia Feed & Grain Association; United States of America, American Feed Manufacturers Association  
128pp. (1979) [many ref. En] Athens, Georgia, USA.  
Price \$4.00

Papers presented at the 1979 Conference which was held at the Marriot Motor Hotel, Atlanta, Georgia on 14-16 Feb. 1979, include: Genetics and carcass composition, by K. W. Washburn (pp. 34-43, 21 ref.). Nutritional factors affecting the carcass quality of broilers, by L. Bartov & S. Bornstein (pp. 44-55, 32 ref.). Influence of excessive magnesium on laying hens [including shell quality], by W. M. Britton (pp. 63-66, 6 ref.). The phosphorus requirement of laying hens [including egg quality], by J. D. Garlich (pp. 104-114, 42 ref.). VJG

## 34

### Performance of laying hens fed on practical diets containing different levels of supplemental biotin during the rearing and laying stages.

Whitehead, C. C.

*British Journal of Nutrition* 44 (2) 151-159 (1980) [20 ref. en] [ARC Poultry Res. Cent., King's Buildings, West Mains Road, Edinburgh EH9 3JS, UK]

The effect of biotin supplementation of low-biotin practical diets during rearing and laying stages on the performance of White Leghorn-type laying hens was studied. Biotin supplements at levels of 0.06 and 0.15 mg/kg had no beneficial effect on egg numbers laid, egg wt, food intake or feed conversion efficiency. Internal egg quality was slightly improved with biotin

supplementation of the layer's diet, at an approx. linear rate of 0.025 Haugh units/ $\mu\text{g}$  biotin. Biotin transfer to the egg was calculated. For the basal diet the daily output of biotin in yolk was approx. 50% greater than the estimated intake; the efficiencies of incorporation of the biotin supplement into the egg were 54 and 37% for the 60 and 150  $\mu\text{g}/\text{kg}$  levels resp. It is concluded that practical diets contain sufficient biotin to support optimum egg-laying performance. AL

## 35

**Productive performance of inter-se mated cross-groups and selected lines among desi and exotic chickens.**

Jain, L. S.; Vijay, R. G.; Jalora, M. L.; Sharma, V. V. *Indian Journal of Animal Sciences* 49 (9) 730-734 (1979) [5 ref. En] [Dep. of Livestock Production & Management, Univ. of Udaipur, Udaipur, Rajasthan 313 001, India]

This paper includes data for the laying performance and egg quality (egg wt., yolk wt., albumen wt., dry shell wt., albumen height, Haugh unit score, and shell thickness) of purebred groups of purebred Desi, White Leghorn and Rhode Island Red hens and their 2- and 3-breed crosses. The relative merits of the various purebred and crossbred groups are discussed. Effects of inter-se mating of reciprocal cross groups are also considered. AJDW

## 36

[Egg cooking.]

QP Corp.

*Japanese Examined Patent* 5 526 822 (1980) [Ja]

Cracking of egg shells during boiling is reduced by sealing the eggs in a plastics bag in a CO<sub>2</sub> atm and then heating the bag. IFT

## 37

[Egg cooking.]

QP Corp.

*Japanese Examined Patent* 5 526 823 (1980) [Ja]

See preceding abstract.

## 38

**Effect of feed restriction on egg weight and egg quality of White Pekin ducks.**

Mani Singh, C.; Singh, R. A.; Sharma, R. K.; Aggarwal, C. K.

*Haryana Agricultural University Journal of Research* 10 (1) 95-100 (1980) [8 ref. En] [Dep. of Livestock, Production and Management, Haryana Agric. Univ., Hissar, India]

3 levels and durations of feed restrictions were imposed on 188 White Pekin ducks i.e. 20, 30 and 40% restrictions for 6-20, 6-24 and 10-24 wk. Albumen and yolk qualities were examined using Haugh units, yolk index, yolk colour and shell thickness as parameters. Haugh units ranged from 86 to 89, yolk index from 0.48 to 0.51 and yolk colour score from 12.18 to 12.64; none were affected by feed restriction. Ducks on restricted diets produced a larger number of medium sized eggs than control ducks. LH

## 39

[Preservability of unpasteurized liquid whole egg by chilling.]

Suzuki, A.; Konuma, H.; Takayama, S.; Imai, C.; Sashihara, N.

*Journal of the Food Hygienic Society of Japan* [*Shokuhin Eiseigaku Zasshi*] 20 (6) 442-449 (1979) [17 ref. Ja, en] [Nat. Inst. Hygiene Sci., Kamiyoga 1-chome, Setagaya-ku, Tokyo, Japan]

Unpasteurized liquid whole egg was stored at 10°C or at 5°C to investigate its keeping quality. After 6 days at 10°C, or after 10 days at 5°C, a fishy or fruity off-odour was detected. Changes in pH, glucose, volatile basic N and trimethylamine N concn. and acidity of ether extract were analysed. In these storage tests, it was found that psychrotrophic bacteria predominated and coliform bacteria and enterococci grew slowly. Most of the isolates forming red colonies on desoxycholate agar were not coliforms. TM

## 40

**Use of fababeans in diets for laying hens.**

Campbell, L. D.; Olaboro, G.; Marquardt, R. R.; Waddell, D.

*Canadian Journal of Animal Science* 60 (2) 395-405 (1980) [10 ref. En, fr] [Dep. of Anim. Sci., Univ. of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada]

A series of experiments was conducted to evaluate fababeans as a source of supplemental protein for use in diets for laying hens. Experimental and commercial-type feeding trials were used to determine the influence of level of dietary addition of fababeans, methionine supplementation, heat treatment of fababeans and dehulling of fababeans on productive performance. When diets adequately supplemented with methionine were used, egg production rates of hens fed fababeans were similar to those of controls except for high dietary levels of fababeans, > 25%, where a depression was indicated. Mortality rates were not influenced by addition of fababeans to the diet. Hens fed fababeans consistently laid eggs of a smaller size than those of controls and the extent of the egg size depression was related to the level of fababeans in the diet. The egg size depressing effect of fababeans was not related to dietary levels of protein or energy and was not influenced by heat treatment of fababeans or removal of hulls from fababeans. Fababeans can be used effectively as a protein source in diets for laying hens and the effect on egg size should be a factor given consideration when the choice to use fababeans is made. AS

## 41

[The importance of food hygiene and technology for the quality of eggs, fish and game.] Die Bedeutung von Lebensmittelhygiene und -technologie für die Qualität von Eiern, Fischen und Wild.

Reusse, U.

*Archiv für Lebensmittelhygiene* 31 (3) 99-101 (1980)

[De] [Veterinäruntersuchungsamt, Lagerstrasse 36, 2000 Hamburg 6, Federal Republic of Germany]

This lecture reviews microbiological health hazards associated with the marketing of fresh eggs, fish and game and their products, and includes the relevant German and EEC regulations. RM

42

**[Improvement to moulded pulp pack.]**

Boursier, L.

**French Patent Application 2 441 549 (1980) [Fr]**

The pack moulded from paper pulp has a part with alveolates and a lid with a flat bottom connected by a hinge, these parts comprising stripped surfaces ending at the hinge. It can be used for egg-boxes in particular. W&Co

43

**Fish meal and egg taint. [Letter]**

Wakeling, D. E.; Fenwick, G. R.; Pearson, A. W.; Butler, E. J.

**Veterinary Record 107 (18) 431 (1980) [2 ref. En] [Min. of Agric., Fisheries & Food, Staplake Mount, Starcross, Devon, UK]**

Problems with a 'fishy' taint in eggs laid by hens receiving diets containing Icelandic capelin fish meal are discussed; breeds laying brown-shelled eggs are especially susceptible. The taint is similar to that observed in eggs of hens receiving a rapeseed meal diet. Trials on hens fed diets with 2.5 or 7.0% capelin meal over a 23 day period showed a 'fish' taint to occur in 7% and 17% resp. of the eggs. Analysis of the eggs revealed the presence of trimethylamine (the compound responsible for the similar taint in eggs of hens fed rapeseed) at concn. of 9–17 µg/g, i.e. much higher than the threshold concn. of 0.8 µg/g. Studies showed that this problem is not due to presence of a trimethylamine oxidase inhibitor in the fish meal; it is possible, however, that it may be due to 'overloading' of sensitive hens with dietary trimethylamine. AJDW

44

**Effect of protein and energy levels in a constant ratio supplemented with methionine and lysine on performance of layers and on egg quality.**

El-Boushy, A. R.; Gils, L. G. M. van;

Papadopoulos, M. C.

**Netherlands Journal of Agricultural Science 28 (1) 29–35 (1980) [19 ref. En] [Dep. of Poultry Husbandry, Agric. Univ., 6700 AH Wageningen, Netherlands]**

720 medium-heavy crossbred laying hens were used in a study on effects of dietary energy and protein level on laying performance and egg quality. 5 diets were tested (the protein:energy ratio being constant), i.e. 12.0% protein, 8.71 MJ metabolizable energy/kg; 12.9% protein, 9.57% MJ/kg; 14.04% protein, 10.27 MJ/kg; 15.02% protein, 11.10 MJ/kg; and 15.97% protein, 11.70% MJ/kg. Laying performance and egg quality were evaluated over a 40-wk period starting at 24 wk of age. Data are given for egg wt., yolk %, albumen % and shell %; no significant effects of the diets studied on these egg characteristics were observed. AJDW

45

**Scandinavian selection and crossbreeding experiment with laying hens. II. Results from the Swedish part of the experiment.**

Liljedahl, L.-E.; Weyde, C.

**Acta Agriculturae Scandinavica 30 (3) 237–260 (1980) [24 ref. En] [Dep. of Anim. Breeding & Genetics, Swedish Univ. of Agric. Sci., Uppsala, Sweden]**

See *Acta Agriculturae Scandinavica* (1979) 29, 273–286 for part I.

46

**Scandinavian selection and crossbreeding experiment with laying hens. III. Results from the Norwegian part of the experiment.**

Kolstad, N.

**Acta Agriculturae Scandinavica 30 (3) 261–287 (1980) [30 ref. En] [Dep. of Poultry & Fur Anim. Sci., Agric. Univ. of Norway, As, Norway]**

This paper includes data for the laying performance, egg wt., egg mass, shell quality (sp. gr.) and albumen height of crossbred hen lines selected for high egg number, for high egg wt., for both high egg number and high egg wt., or for high proportion of egg wt. to body wt. Selection responses in the various lines are discussed, together with heritabilities of the characteristics studied. [See preceding abstr. for part II.] AJDW

47

**Scandinavian selection and crossbreeding experiment with laying hens. IV. Results from the Danish part of the experiment.**

Sorensen, P.; Ambrosen, T.; Petersen, A.

**Acta Agriculturae Scandinavica 30 (3) 288–308 (1980) [24 ref. En] [Dep. of Poultry and Rabbits, Nat. Inst. of Anim. Sci., DK-1958 Copenhagen V, Denmark]**

This paper includes data for the laying performance, egg wt., albumen height and shell quality (sp. gr.) of crossbred hens of lines selected for high egg wt., high egg number, or both high egg wt. and high egg number. Genetic correlations between the characteristics studied are given, together with heritability estimates. [See preceding abstr. for part III.] AJDW

48

**Genotypic and phenotypic parameters of egg production and egg quality traits of Desi fowl.**

Jitendra Kumar; Acharya, R. M.

**Indian Journal of Animal Sciences 50 (4) 514–517 (1980) [10 ref. En] [Haryana Agric. Univ., Hissar, Haryana 125 004, India]**

This paper includes tables of data for the wt., shape index, Haugh unit score, shell thickness, yolk index, yolk colour value, % blood spots and % meat spots of eggs laid by Desi hens, together with heritabilities and genetic and phenotypic correlations between egg quality characteristics, laying performance traits and 2-wk and 12-wk body wt. These results are discussed in relation to the potential for selection for improved laying performance and egg quality. AJDW

49

### Ultrasonic vibration as an aid in the acetic acid method of cleaning eggs.

Heath, J. L.; Owens, S. L.; Goble, J. W.

*Poultry Science* 59 (4) 737-742 (1980) [9 ref. En] [Dep. of Poultry Sci., Univ. of Maryland, College Park, Maryland 20742, USA]

Experiments were conducted to evaluate the use of ultrasonic vibration as an aid to the dilute acid method of cleaning eggs. Penetration of the cleaning solution into the egg, shell thickness, shell cleanliness, interior quality, and microbial, organoleptic, and functional properties were measured. Shell penetration was less when the egg and acetic acid solution were the same temperature ( $22^{\circ}\text{C}$ ) at time of washing than when the eggs were  $22^{\circ}\text{C}$  and the solution was at either  $12^{\circ}$  or  $32^{\circ}\text{C}$ . When egg and cleaning solution were at  $22^{\circ}\text{C}$ , no cleaning solution penetrated the shell after 5, 10, 20, 40 and 80 s of exposure but penetration increased after 160 and 320 s of exposure. No differences ( $P > 0.05$ ) in shell thickness resulted from cleaning in 1, 2 or 3% acetic acid with ultrasonic vibration for 30, 60, 120, and 240 s, and the shell thickness of eggs so treated did not differ ( $P > 0.05$ ) from that of commercially washed eggs. All 3 solutions produced clean eggs at each exposure time, and their cleanliness was comparable to that of commercially washed eggs. No differences ( $P > 0.05$ ) in Haugh unit score were caused by length of exposure to the cleaning solution and by exposure to ultrasonics. After 4 wk storage at  $22^{\circ}\text{C}$  only eggs exposed to ultrasonics in the 1% solution had lower ( $P < 0.05$ ) Haugh unit scores than those washed without ultrasonics; however, their average grade was still Grade A. After storage for 1, 2, 3, and 4 wk at  $23^{\circ}\text{C}$  eggs washed in 3% acetic acid with and without ultrasonics had one log cycle less ( $P < 0.05$ ) total plate count than untreated eggs. When taste panel, sponge cake height, or form stability data were analysed, no differences ( $P > 0.05$ ) were found to have been caused by ultrasonic vibration during washing with 3% acetic acid.

AS

50

Proceedings of the inaugural conference, University of New England, Armidale, NSW, Australia, August 25-28, 1979. [Conference proceedings]

Australia, Australian Association of Animal Breeding & Genetics

xv + 404pp. ISBN 0-9595125-0-0 (1979) [many ref. En] Werribee, Victoria, Australia

Abstracts are given of papers presented at this conference, held at the University of New England, Armidale, New South Wales, Australia on 25-28 Aug. 1979, including the following which give data for milk quality, egg quality, carcass quality, etc. Results from New Zealand beef breed evaluation trials, by R. L. Baker & A. H. Carter (pp. 51-52). Post-weaning growth and carcass characteristics of Chianina, Brahman and Hereford cross and Hereford steers in Southern Queensland, by R. T. Strachan, W. J. Peart, R. G. Coleman & R. K. O'Rourke (pp. 53-55). Definition in beef cattle improvement: Southern Australia, by C. A.

Morris (pp. 106-117, 51 ref.). Phenotypic and genetic associations within and between live-animal and carcass characters in beef cattle: a survey of the literature, by B. J. M. Holland (pp. 155-158, 6 ref.). Techniques for assessment of carcass composition, by J. M. Thompson (pp. 175-176). The accuracy of live-animal estimates to predict carcass characters and a comparison of 2 carcass fat measuring devices, by B. J. M. Holland (pp. 177-178, 1 ref.). Measurement in dairy cattle improvement, by K. A. Rathie (pp. 205-213, 23 ref.). Measurement in dairy cattle improvement, by E. G. G. Rowley (pp. 214-218). Definition in pig improvement, by J. F. R. Berting (pp. 254-258, 1 ref.). Selection for efficient lean growth in pigs on high levels of feeding, by C. P. McPhee (pp. 276-277). Definition in poultry improvement, by R. A. E. Pym (pp. 284-290, 13 ref.). Definition in poultry improvement, by J. J. Moth (pp. 291-293, 3 ref.). Measurement in poultry improvement, by E. E. Best (pp. 296-300). AJDW

51

[New method for determining naturally-occurring  $^{14}\text{C}$  in biological material.] Neue Methode für die Bestimmung des natürlichen Kohlenstoff-14-Gehaltes in biologischem Material.

Müller, H.; Fischer, E.

*Zeitschrift für Analytische Chemie* 302 (3) 199-202 (1980) [13 ref. De, en] [Bundesforschungsanstalt für Ernährung, D-7500 Karlsruhe, Federal Republic of Germany]

After quantitative combustion of the sample and absorption of  $\text{CO}_2$  in  $\text{NaOH}$  solution,  $\text{CO}_2$  is precipitated as  $\text{BaCO}_3$  and finally released by phosphoric acid. It is absorbed in 2-aminopropanol with formation of carbamate. After addition of a suitable scintillation system, the  $^{14}\text{C}$  activity is measured in a liquid scintillation spectrometer. Limit of detection is about 1.2 pCi/g C. Apparatus for combustion and for preparation of samples for scintillation detn. are shown in diagrams. Temp. programmes for combustion of foods of vegetable and animal origin (milk, eggs, meat) are tabulated. RM

52

[World importance of meat products.]

Madrid Vicente, A.

*Alimentaria* No. 110, 79-82 (1980) [Es] [Catedra de Operaciones Basicas, Escuela Tecnica Superior de Ingenieros Agron., Madrid, Spain]

This overview of world distribution of bovine, porcine and wool-bearing animals, production and geographical distribution of meat and meat products, and increases in meat production between 1970 and 1980 includes a listing of uses of meat products and by-products. Tabulated data are included on the contents of 10 essential amino acids in various meat meals, skim milk, eggs, barley and maize. JMa

53

**Packaging makes a difference.**

Gardner, F. A.

*Texas Agricultural Progress* 25 (3) 26-27 (1979) [En]  
[Dep. of Poultry Sci., Texas Agric. Exp. Sta., Texas A&M Univ., College Station, Texas 77843, USA]

Egg packaging is discussed from the consumer standpoint. About 75% of retail egg buyers open the carton and examine the product for egg number, size and uniformity and shell cleanliness and damage. Packaging can also be used more effectively for advertising and selling the eggs. Possibilities considered are: nutritional labelling, variable egg number/pack, variable pricing indices, better protective coverings and CO<sub>2</sub> and moisture control via the package, as a partial replacement of refrigeration. LH

54

**Determination of microelement content in the samples from the cycle of intensive poultry breeding.**

Djuric, G.; Ajdacic, N.

*Journal of Radioanalytical Chemistry* 59 (2) 435-443 (1980) [5 ref. En] [Fac. of Vet. Sci., Univ. of Belgrade, Belgrade, Yugoslavia]

Results of analysis of samples of poultry meat (red and white meat of broilers and laying hens), eggs (white, yolk and white + yolk), poultry feeds and drinking water used in intensive poultry breeding in Yugoslavia are given. 20 chemical elements, Sm, Lu, Eu, Hf, Ce, Yb, Cr, La, Br, Sb, Cs, Sc, Fe, Co, Na, Ta, Tb, Zr, Rb and Zn were quantitatively determined in all samples by nondestructive neutron activation analysis. Br content was highest in red and white meat of broilers, and higher in red meat than white meat of layers; its content in eggs was considerably lower, and like Na but unlike other elements in that its content was higher in egg white than in yolk. The content of Fe in red meat of broilers was considerably lower than in the white meat. Zn accumulation was highest in red meat of laying hens and in egg yolk. AL

55

**Performance of four strains of laying hens in open and enclosed housing in Hawaii.**

Herrick, R. B.; Ross, E.

*Research Report, Hawaii Agricultural Experiment Station* No. 233, 13pp. (1979) [7 ref. En] [Hawaii Agric. Exp. Sta., Univ. of Hawaii, Hawaii, USA]

The performance of 4 strains of laying hens in enclosed housing with mechanically controlled ventilation at high (8-12 ft<sup>3</sup> min/bird) or medium ventilation rate (3.5-6 ft<sup>3</sup> min/bird) or naturally ventilated open-sided housing was compared. Tabulated results showed that egg production was significantly affected by strain but not by type of housing; egg wt. was affected by both strain and housing (heavier eggs in the open house), albumen quality (Haugh Units) was higher in both enclosed houses, shell quality (sp. gr.) was better in the open house. Euribrid and H & N hens produced eggs with better albumen quality than Hy-Line or Shaver; H & N hens produced eggs with better shell quality than the other 3 strains. RM

56

**Postmolt performance of four strains of laying hens in open and enclosed housing in Hawaii.**

Herrick, R. B.; Ross, E.

*Research Report, Hawaii Agricultural Experiment Station* No. 245, 12pp. (1980) [7 ref. En] [Hawaii Agric. Exp. Sta., Univ. of Hawaii, Hawaii, USA]

The post-moult performance of laying hens (the same conditions as described in the previous abstr.) was compared. Egg production and egg wt. were significantly affected by strain but not by housing; egg quality (Haugh units) was better in the enclosed houses than in the open house, and was significantly affected by hen strain. Shell thickness was significantly higher in the open than in either enclosed house. Shaver and H & N hens produced better quality eggs than Hisex and Hy-Line. RM

57

**[Free amino acid composition of fresh and stored hard-boiled eggs.] Muster freier Aminosäuren in frischen und gelagerten hartgekochten Eiern.**

Partmann, W.; Schlaszus, H.

*Zeitschrift für Ernährungswissenschaft* 19 (1) 14-20 (1980) [11 ref. De, en] [Bundesforschungsanstalt für Ernährung, 7500 Karlsruhe, Federal Republic of Germany]

Free amino acid composition of the yolk and white of hard-boiled (17 min) eggs was determined by column chromatography during storage of hard-boiled eggs for 29 days. Eggs ≤ 1 day old were boiled and were then stored at 4°C, 85% RH, or at 20°C, 75% RH. A portion of the eggs stored at 20°C was given a treatment with commercial shell coating resin while still hot. Free amino acid content (as µmol/g DM) is tabulated for 5-day-old raw egg and is presented graphically for yolks and whites of boiled eggs 2, 8 and 29 days after boiling. Free amino acid concn. were an order of magnitude higher in yolks than in whites in raw eggs. Free amino acid content of whites increased significantly during storage, and was already significantly higher than in raw eggs 1 day after boiling. Concn. of free amino acids of yolks decreased with storage. Storage conditions did not significantly affect results. Changes in free amino acid concn. in yolks and whites were concluded to be due to diffusion, as free amino acid content of whole egg increased only slightly (by approx. 5%) during 29 days. Glutamine content of whole egg decreased over this period. Freshly prepared hard-boiled eggs may be distinguished from stored hard-boiled eggs on the basis of free amino acid concn. in yolks and whites, but not in the whole egg. DIH

58

**Classification of bacteria from commercial egg washers and washed and unwashed eggs.**

Moats, W. A.

*Applied and Environmental Microbiology* 40 (4) 710-714 (1980) [24 ref. En] [Agric. Res., USDA, Beltsville Agric. Res. Cent., Beltsville, Maryland 20705, USA]

Studies were conducted on classification of a total of 432 bacterial isolates from washed and unwashed eggs, wash water, and the brushes and conveyors of washing equipment used at 5 egg-grading plants in Maryland and S.E. Pennsylvania. Tables of data are given for bacterial counts, and for the microflora present. Plate counts on equipment varied considerably between grading plants, reflecting differences in efficiency of cleaning. Total counts on washed eggs were appreciably lower than those on unwashed eggs. The bacterial flora of unwashed eggs differed considerably from that of wash water and equipment; the flora of unwashed eggs had relatively high proportions of *Escherichia coli*, *Streptococcus faecalis* and *Aerococcus* spp., which were absent from other samples, whereas equipment surfaces and wash water had higher counts of actinomycetes, together with considerable numbers of *Alcaligenes* and *Moraxella* spp., which are not found on unwashed eggs. The surface bacterial flora of washed eggs is intermediate between those of unwashed eggs and of equipment/wash water. Possible effects of the temp. (40–50°C) and relatively alkaline pH (10–11) of the wash water on the microflora are briefly considered. Results recorded in this study are compared with literature data. AJDW

## 59

[Storage life of hard-boiled eggs.] Untersuchungen zur Haltbarkeit von hartgekochten Eiern.

Partmann, W.; Wedler, A.

*Zeitschrift für Ernährungswissenschaft* 18 (3) 191–208 (1979) [27 ref. De, en] [Bundesforschungsanstalt für Ernährung, 7500 Karlsruhe, Federal Republic of Germany]

Quality changes in hard-boiled eggs stored in their shells were investigated, to throw light in particular on the commercial practice (at Easter time) of storing painted (lacquered) hard-boiled eggs for retail at room temp. Eggs studied were from a genetically uniform flock (HNL-Lohmann); 1-day old eggs were boiled for 17 min in a standard apparatus, some of the eggs were then immediately dipped in a commercial dyed shell lacquer, and eggs were then grouped into the following storage groups (500 eggs/group): (i) 4°C 85% RH in air; (ii) 20°C 73% RH in air; (iii) lacquered shell 20°C 75% RH in air; (iv) 20°C 100% RH in CO<sub>2</sub> atm. Changes in wt. DM content, inorganic phosphate, total free amino acid, lecithin and vitamin contents and sensory properties are presented graphically or in tables. Wt. losses were lowest in (iii) and were very high in (iv). Changes in inorganic phosphate showed great variation between samples in any group and could not be used for quality detn. Concn. of total free amino acids in egg yolk fell rapidly (from 35–45 mg amino-N/100 g DM) to approx. 20 mg amino-N/100 g DM a few days after boiling and remained at this level thereafter in (i)–(iii). Concn. in egg white increased slightly to 20 mg amino-N/100 g DM and remained at this level; in (iv) free amino concn. in egg yolk and white declined throughout. Lecithin degradation proceeded more slowly in (i) and (iii) than in (ii) and (iv). Of the vitamins studied, only vitamin A decreased significantly in whole egg in 80 days. Sensory evaluations of colour, aroma and flavour, and data on lecithin and vitamin changes,

were used to estimate max. storage lives for boiled eggs to be classed as 'marketable'; these were 14–16 days for (i) and (iii), and 6 days for (ii) (only 5 days if microbiological data are taken into account). Sensory properties of (iv) eggs deteriorated rapidly in the 1st few days. DIH

## 60

[Microbiological aspects of stored hard-boiled eggs.] Mikrobiologische Aspekte gelagerter, hartgekochter Eier.

Bomar, M. T.

*Zeitschrift für Ernährungswissenschaft* 18 (4) 233–238 (1979) [13 ref. De, en] [Engesserstrasse 20, 7500 Karlsruhe 1, Federal Republic of Germany]

Eggs treated and stored as in the preceding abstr. were examined microbiologically at intervals during storage. Bacterial count of freshly boiled eggs was < 10<sup>2</sup>/g. Storage at 4°C most strongly inhibited growth of microorganisms; bacterial count in (i) was < 10<sup>2</sup>/g after 10 wk. Bacterial count in (ii) was > 10<sup>6</sup>/g after 1 wk storage (*Bacillus cereus* and *B. cereus* var. *mycoides* were important components of the microflora). Lacquered eggs kept well; total aerobic count in (iii) was < 10<sup>2</sup>/g after 5 wk (mainly *Bacillaceae*) at which time total anaerobes reached 9 × 10<sup>2</sup>/g. Storage in CO<sub>2</sub> delayed microbial decay vs. (ii), but altered composition of bacterial population thus giving rise to inferior sensory properties as reported in preceding abstr. Anaerobes were the major part of the microflora in (iv) after 1 wk at 9.12 × 10<sup>3</sup>/g; after 2 wk anaerobic count was 3.7 × 10<sup>6</sup>/g, and aerobes were 7.6 × 10<sup>6</sup>/g. DIH

## 61

[Prospective methods for evaluating the quality of poultry products. I. Eggs and egg products.]

Jarossova, M.

*Hydinarsky Priemysel* 22 (5/6) 211–219 (1980) [14 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Recommendations are given for analytical methods and equipment in small, medium and large-scale laboratories in the egg industry. Aspects considered include detn. of shape, strength, porosity etc. of the egg shell, physicochemical, nutritional and microbiological characteristics of the albumen and yolk, and testing for contamination with pesticides, antibiotics, carcinogens, etc. STI

## 62

Factors influencing composition of an egg: a review.

Panda, P. C.

*Indian Journal of Nutrition and Dietetics* 17 (3) 99–105 (1980) [60 ref. En] [Anim. Products Tech., Haryana Agric. Univ., Hissar, India]

Aspects considered include effects of hen breed and strain, species of bird, diet, age of bird, season and storage, and coating with oil or polymers on the composition of eggs. CFTRI

## 63

**Quality of duck eggs marketed in Mysore city.**

Panda, P. C.; Rao, D. N.

*Indian Poultry Gazette* 64 (1) 7-11 (1980) [11 ref. En]  
[Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Duck eggs marketed in Mysore were generally of a poorer quality during July, Aug., and Sept. than during Oct. and Dec. Nest-clean eggs constituted only 17.1% of the total, while dirty eggs accounted for nearly 40.1%. The microbiological quality of the eggs was generally poor. Some of the *Escherichia coli* strains isolated belonged to serogroups which cause public health problems. CFTRI

## 64

**[Effects of modern drug therapy on food hygiene.]**

Lebensmittelhygienische Auswirkungen moderner Tierarzneimitteltherapie. [Review]

Somogyi, A.

*Fleischwirtschaft* 60 (6) 1157-1159; 1215 (1980) [29 ref. De, en] [Inst. für Vet. Med. (Robert-von-Ostertag Inst.) des Bundesgesundheitsamtes Thielallee 88-92, D-1000 Berlin 33]

This review discusses health hazards due to long- and short-term ingestion of drug residues from meat and meat products, milk and eggs. Potential health hazards are classified into 3 groups: toxic (including mutagenic, carcinogenic and teratogenic effects); microbiological (causing changes in intestinal flora); and immunological (through resistance transfer, allergy reactions). [See preceding abstr.] RM

## 65

**[Effect of different levels of krill flour in 'D' mixture on some characteristics of hen eggs and meat.]**

Faruga, A.; Tywonczuk, J.; Skorko, H.; Siekiera, J.; Zarzecka, T.

*Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Zootechnika* No. 19, 107-117 (1979) [15 ref. Pl, ru, en] [Inst. Hodowli & Tech. Produkcyj Zwierzącej, AR-T, Olsztyn, Poland]

4 groups of 5 Leghorn layers received for 3 months (i) a standard 'D' mixture (control), (ii) an inferior vegetable mixture, (iii) mixture D with 8% krill flour, or (iv) mixture D with 4% krill flour. Mean values with variation coeff. are tabulated for : sp. gr., shape index, shell thickness at 2 sites, wt. of egg, yolk, albumen and shell, and yolk colour of 54 egg batches of (i)-(iv); for DM, crude protein, crude fat and ash % in eggs from the last wk of the experiment; and for results of slaughter analysis of the hens (slaughter yield and proportions of breast muscles, heart, liver and internal fat as % slaughter wt.). Further, results of organoleptic evaluation (aroma, colour and taste) of scrambled eggs, soft-boiled eggs, and sponge cake made with eggs; and of broth, breast muscles and leg muscles of (i)-(iv) are presented. The results are discussed in detail. Yolk colour was significantly deeper in (iii) and (iv) eggs; organoleptically, eggs and meat of (iv) were slightly inferior to those of (i)-(iii). No other notable differences concerning the krill flour were detected. SKK

## 66

**An enzymic assay for  $\beta$ -hydroxybutyric acid in liquid whole egg.**

Parry, A. E. J.; Robinson, D. S.; Wedzicha, B. L.  
*Journal of the Science of Food and Agriculture* 31 (9) 905-910 (1980) [5 ref. En] [Procter Dep. of Food Sci., Univ. of Leeds, Leeds LS2 9JT, UK]

An assay method for D- $\beta$ -hydroxybutyric acid ( $\beta$ -HOBu), a characteristic component of incubator reject eggs, is described. Liquid egg samples are prepared for assay by addition of perchloric acid (60% w/v) to precipitate protein, which is removed by centrifugation, recovering the supernatant beneath the lipoprotein plug, adjusting the pH of this to 8.2-8.6 (using KOH and Tris buffer), centrifuging off insoluble potassium perchlorate after cooling in ice and using the final supernatant for assay. The assay is based on reduction of NAD by  $\beta$ -HOBu dehydrogenase, measuring absorbance change at 340 nm. Reaction mixtures contain 0.5 ml 0.05mm Tris pH 8.4 + 0.5 ml 2mm hydrazine hydrate pH 8.4 + 0.4 ml 10mm NAD. Unknown sample (0.5 ml) is added, vol. is made up to 3 ml with  $H_2O$  and enzyme is added (10 units; 1 unit = change of 0.01 absorbance unit/min). The assay detected concn. as low as 20  $\mu$ mol  $\beta$ -HOBu/l liquid whole egg and gave reproducible results. Initial rate was proportional to  $\beta$ -HOBu concn. under conditions used, and was used to calculate  $\beta$ -HOBu concn. Amount of  $\beta$ -HOBu in 18-day old incubator reject eggs was 1.81-2.29 mmol/l. Concn. of  $\beta$ -HOBu in mixtures of liquid fresh egg and incubator reject egg increased linearly with amount of incubator reject egg. Details of the recommended assay procedure are in an unpublished appendix, available from the British Library, Boston Spa, as supplementary publication SUP 11030. DIH

## 67

**Rapeseed meal and egg taint: the role of sinapine.**

Pearson, A. W.; Butler, E. J.; Fenwick, G. R.

*Journal of the Science of Food and Agriculture* 31 (9) 898-904 (1980) [19 ref. En] [Houghton Poultry Res. Stat., Huntingdon, Cambridgeshire PE17 2DA, UK]

## 68

**[Eggs and egg products in foods.]** Eier und Eierprodukte in Lebensmitteln.

Stade, V.; Dung, R.

*Verbraucherdiest* 25 (9) 204-207 (1980) [De] [Inst. für Anatomie, Physiologie & Hygiene der Haustiere, Univ. Bonn, Federal Republic of Germany]

Aspects considered include: classification of eggs; use of non-fertile incubated eggs for preparation of pasteurized egg products; legal definitions of various egg products in the Federal Republic of Germany; commercially-available fresh, frozen and dried whole egg, egg yolk and egg albumen products; applications of egg products in manufacture of pasta, bakery products, meat products, confectionery and liqueurs; and hygienic aspects of eggs and egg products, and foods containing eggs. AJDW

## 69

**Dietary influences on the feeding of various fish meals and a soya-based meal to chickens and laying hens.** (In 'Advances in fish science and technology' [see FSTA (1981) 13 6R300].) [Lecture]

Smith, J. G. M.; Hardy, R.; Woodham, A. A.  
pp. 325-332 (1980) [13 ref. En] [Torry Res. Sta., Aberdeen, UK]

There are many problems associated with the possibility of utilizing krill for direct human consumption; an alternative possibility is that krill could be converted into a meal and incorporated into animal feeds. This paper reports on feeding trials with broilers and laying hens fed for  $\leq 9$  wk on 4 cereal-based diets containing (i) soybean meal, (ii) commercial white fish meal, (iii) commercially dried krill meal, or (iv) freeze-dried krill meal, the main aim of the studies being to determine whether any fishy flavours or colouring was transferred to the eggs and flesh; (iii), which contained 59.6% crude protein, was prepared on board ship by heating whole krill to 90-95°C followed by pressing, drying and grinding, while (iv), which contained 65% crude protein, was prepared from frozen (-30°C) whole krill by drying at 0.05 Torr and -20°C for 24 h. The studies included detn. of the effect of the 4 diets on: % lipid content and % composition of fatty acids in eggs, flesh, heart and liver; absorption spectra of the lipids; and sensory quality (flavour) of hard-boiled eggs and of roasted and casserole flesh. Results are detailed in graphs and tables. Major conclusions were that (iii) and (iv) could be used as replacements for (ii) in broiler diets but that (iv) would not be acceptable in egg-laying diets because of flavour transfer to the yolks. Both (iii) and (iv) could also influence the acceptability of eggs since they produced a red/orange yolk. JA

## 70

**The science of animal husbandry.** [Book]

Blakely, J.; Bade, D. H.  
Ed. 2, xii + 516pp. ISBN 0-8359-6975-4 (1979) [En]  
Reston, Virginia, USA; Reston Publishing Co. Inc. Price \$15.95 [Dep. of Anim. Sci., Univ. of Missouri, Missouri, USA]

This detailed textbook of animal husbandry, intended for students, includes the following chapters giving information on carcass quality, milk quality, etc. The beef industry (pp. 12-41). Beef cattle selection (pp. 92-109). The beef carcass (pp. 110-123). The dairy industry (pp. 166-174). Milk secretion and milking machines (pp. 196-204). Sheep selection (pp. 234-241). Lamb, mutton and fiber (pp. 242-250). The swine industry (pp. 258-268). Swine selection (pp. 310-320). The pork carcass (pp. 321-330). The broiler and layer industry (pp. 395-400). An appendix on Canadian beef and pork grading systems is given. A 6pp. subject index is included.

AJDW

## 71

**[Salmonellae in poultry, with special reference to sampling schedules.]** Salmonellenbefall bei Geflügel unter Berücksichtigung von Probenplänen.  
Henner, S.; Schneiderhahn, M.; Kleih, W.

**Fleischwirtschaft** 60 (10) 1889-1893 (1980) [9 ref. De, en] [Landesuntersuchungsamt für das Gesundheitswesen Südbayern, Veterinärstrasse 2, D-8042 Oberschleissheim, Federal Republic of Germany]

A large amount of material was used to study the *Salmonella* contamination of commercial poultry products (frozen broilers, turkey pieces, poultry livers, chicken stomachs and hearts, eggs, and fresh broilers before and after immersion chilling). The sampling schedules had been developed over the past 2 yr. Tabulated data show the incidence of *Salmonella* types in all the products, and selective bacterial counts in chicken livers and fresh carcasses: frozen broilers 14%, 12 strains; turkey pieces 2.7%, 2 strains; eggs 0.35%, 2 strains; livers 52%, 20 strains (75% of samples with total counts  $10^4$ - $10^5$ , bacilli  $10^3$ - $10^4$ ; only 10% of Enterobacteriaceae at  $10^3$ /g); stomachs and hearts 51%, 18 serotypes; fresh broilers 48% (43% before, 57% after immersion chilling; 87% with  $10^4$ - $10^6$  total aerobes/g, 56% with  $10^3$ - $10^4$  Enterobacteriaceae/g before chilling, falling to 76% with  $10^4$ - $10^5$  and 52% with  $10^3$ - $10^4$ /g resp. after chilling). The occasional high levels of contamination and increases in incidence of salmonellae are discussed, together with preventive measures. RM

## 72

**[National Food Administration Ordinance amending Ordinance SLV 1973:2 on eggs and egg products.]** Sweden, Statens Livsmedelsverk

**Statens Livsmedelsverks Förfatningssamling SLV FS 1980:12, 5pp. (1980) [Sv]** [Box 622, 751 26 Uppsala, Sweden]

Amendments to Ordinance SLV 1973:2 on eggs and egg products are given covering: definitions of the products; min. DM and fat contents of egg products; storage temp. for fresh eggs; prohibition of food use of eggs from diseased hens, incubated eggs, cracked eggs or eggs containing drug residues; quality of eggs for manufacture of liquid egg; washing of eggs before mechanical cracking; heat-treatment of egg products; cold storage of liquid egg products; bacteriological quality requirements; and labelling requirements. This Ordinance came into force on 1 April 1981. AJDW

## 73

**[Ratio of iodine to bromine in food.]** Untersuchungen zur Jod-Brom-Relation in Lebensmitteln.  
Montag, A.; Grote, B.

**Zeitschrift für Lebensmittel-Untersuchung und -Forschung** 172(2) 123-128 (1981) [6 ref. De, en]  
[Ordinariat für Lebensmittelchemie, Univ. Hamburg, D-2000 Hamburg 13, Federal Republic of Germany]

Effects of Br in foods on iodine deficiency symptoms are discussed, and a method for isolation of Br and I from foods and for their detn. is described. Food samples are ashed in the presence of magnesium acetate as ashing aid. The ash is dissolved and added to phenol red solution; Chloramine T solution is added to oxidize Br<sup>-</sup> and I<sup>-</sup> to the corresponding halogens, which then react with the phenol red. Halogen-substituted phenol red is adsorbed onto polyamide

powder, which serves as a medium for quantitation by wavelength dispersive X-ray fluorescence analysis. For analysis of table and cooking salt, the I<sup>-</sup> and Br<sup>-</sup> are extracted with methanol. The method was applied to a wide range of foods, and tabulated data show contents of Br and I, and their mol/mol ratio in salt, milk [cow's, goats and human; I/Br ratios of 1:137-1:60, 1:84-1:80 and 1:51, resp.], eggs, infant foods, fruit and vegetables, and fish and seafoods. As expected, fish and seafood had the highest absolute contents of the halogens and the most favourable I/Br ratio (most between 1:4 and 1:50). Sea salt on the other hand had very low amounts of I<sup>-</sup>, and very low I/Br ratios. DIH

## 74

**Effect of genetic factors on the nutrient composition of animal products. [Review]**

Warwick, E. J.

*Animal Breeding Abstracts* 48 (12) 843-858 (1980) [104 ref. En][USDA, Beltsville, Maryland 20705, USA]

This review covers inter-species and within-species variation in the composition of milk, red meat, poultry meat, eggs, and freshwater fish and sea foods. Compilations of literature data for nutrient contents of these foods are given. AJDW

## 75

**[Survey of pollution with polychlorinated biphenyls in Tokyo. VI. Polychlorinated biphenyl content of foods.]**

Yamazaki, K.; Yamanobe, H.; Suzuki, S.; Harada, H. *Annual Report of Tokyo Metropolitan Research Laboratory of Public Health* 29 (1) 234-237 (1978) [5 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

Data are given for the polychlorinated biphenyl (PCB) content of foods collected from markets and small shops in Tokyo over the period April 1977-May 1978. Mean values and ranges (with number of samples in parentheses) for various foods were (p.p.m. wet wt. basis): fish muscle (156) 0.03 and 0.00-0.55; fish internal organs (151) 0.17 and 0.00-5.37; butter (5) 0.01 and 0.00-0.02; processed cheese (5) 0.01 and 0.00-0.01; milk (10) 0.00 and 0.00-0.01; chicken (3) 0.01 and 0.01-0.02; chicken liver (2) 0.01 and 0.00-0.01; and hens' egg (10) 0.00 and 0.00-0.01. No PCB was detectable in 5 samples of modified dried milk, 3 samples of pork, 2 samples of porcine liver, 2 samples of beef or 3 samples of bovine liver. AJDW

## 76

**[Survey of pollution with polychlorinated biphenyls in Tokyo. VII. Polychlorinated biphenyl content of foods.]**

Yamazaki, K.; Yamanobe, H.; Suzuki, S.; Harada, H. *Annual Report of Tokyo Metropolitan Research Laboratory of Public Health* 30 (1) 133-136 (1979) [5 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

The study of polychlorinated biphenyl (PCB) content in foods retailed in the Tokyo area [see preceding abstr. for part VI] was continued in April 1978-March 1979. Mean and ranges of PCB contents found (with numbers of samples in parentheses) were as follows: fish muscle (300 = 60 spp.) 0.05, 0.00-1.42 p.p.m. wet wt.; fish internal organs (58) 0.68, 0.00-11.50 p.p.m. wet wt.; butter (10) 0.01, 0.00-0.03 p.p.m. wet wt.; processed cheese (10) 0.02, 0.00-0.09 p.p.m. extractable fat (EF); modified dried milk (10) 0.01, 0.00-0.04 p.p.m. EF; milk (20) 0.03, 0.00-0.07 p.p.m. EF; and hens' eggs (20) 0.00, 0.00-0.01. Mean contents in meat and liver from pigs, cattle and chickens were 0.00 p.p.m. (5 samples each) except chicken liver, 0.01 p.p.m., (occasional samples of each contained 0.1-0.2 p.p.m.). [From En tables.] DIH

## 77

**[Vertical product integration in the poultry and egg industries in Czechoslovakia.]**

Sladek, F.

*Hydinarsky Priemysel* 22 (7/8) 265-272 (1980) [Sk] [Brubezarsky Prumysl, Generalni Reditelstvi, Prague, Czechoslovakia]

## 78

**Studies on some characters of egg production of local turkey in North Iraq. II. Studies on some characters of egg quality.**

El-Hamadi, H.; Riad, S. A.; Nagib, F. E.

*Annals of Agricultural Science, Moshtohor* 12, 339-348 (1980) [20 ref. En, ar][Dep. of Anim. Production, Fac. of Agric., Assiut Univ., Egypt]

Eggs from black, red and white turkeys from 3 regions of Iraq were studied for their quality characteristics. Average shape index was 72.62; yolk index was 44.05. Shell thickness was 0.345 mm, and shell membrane thickness was 0.0583 mm. Shell, yolk and albumen proportions were 12.67%, 30.31% and 57.13%, resp. The quality characters were highest in eggs laid by birds from the Sulaymania region, followed by those laid by birds from the Taamim and Arbil regions. Egg quality was highest in red birds, followed by black and white birds. Correlation coeff. between quality traits and production characteristics were not significant. JRR

## 79

**[Survey of methods for long term storage of poultry eggs. XVIII. The effect of diacetomonoglyceride and mineral oil coatings on interior quality of hens' eggs.]**

Tanabe, H.; Ogawa, N.

*Japanese Poultry Science [Nihon Kakin Gakkai-shi]* 17 (2) 94-99 (1980) [8 ref. Ja, en][Dep. of Human Nutr. & Food Sci., Gifu Women's Coll., Taromaru, Gifu-shi, 501-25 Japan]

Hen's eggs were coated with diacetomonoglyceride (DAMG) or liquid paraffin approx. 24 h after laying, and stored at 25°C for up to 13 wk. Eggs coated with DAMG had a much better interior quality in terms of Haugh units, yolk index, wt. loss, and incidence of yolk collapse and rotting, than did uncoated eggs. Regression equations relating quality to storage time

were similar for eggs coated with liquid paraffin and those coated with DAMG. [From En summ.] [See FSTA (1980) 12 7Q132 for part XVII.] JRR

## 80

[Changes in weight and air space size of eggs stored under different storage conditions.]

Donchev, Kh.; Koleva, R.

*Khranitelna Promishlenost* 28 (8) 21-22 (1979) [4 ref. Bg]

Hens' eggs were stored on trays on the 2nd day after laying (i) at 22-25°C for 30 days, (ii) in a domestic refrigerator at 2°C for 60 days, or (iii) in a refrigerated store at 0°C for 150 days. For each of (i)-(iii), storage was without packaging or in heat-sealed 0.04 mm thick polyethylene bags. Air space height and egg wt. were determined at intervals during storage. The results are graphically presented. Air space height increased and egg wt. of all samples decreased progressively during storage, but the extent of changes varied with storage treatment severity, being greatest in unpackaged (i) eggs, and least in packaged (iii) eggs, storage life of the latter being increased by 1-3 months relative to the former. SKK

## 81

[Fungal contamination of refrigerated hens' eggs.]

Dragon, I.

*Archivio Veterinario Italiano* 30 (3/4) 129-133 (1979) [13 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli Studi di Milano, Milan, Italy]

Studies were conducted on growth of fungi in or on eggs cold stored for 2 months. Of eggs undergoing fungal spoilage, 75% contained *Mortierella reticulata*, 55% contained *Thamnidium elegans*, 90% contained *Penicillium cyclopium*, 30% contained *P. oxalicum*, 70% contained *Cladosporium herbarum*, 60% contained *Scopulariopsis fusca* and 43% contained *Botrytis cinerea*. Characteristics of spoilage by these organisms are discussed. AJDW

## 82

[Effect of various processing procedures on SH-group contents of newly-laid hens' eggs.]

Bakalivanov, S.; Bakalivanova, T.; Mitkov, S.; Tsvetkov, Ts.

*Khranitelna Promishlenost* 28 (6) 35-36 (1979) [8 ref. Bg]

(i) Egg yolk, (ii) egg white, and (iii) a mixture of both, all from newly laid eggs, were either fermented with

0.3% yeast for 5 h at 32-33°C, pH being maintained at 5.9 by citric acid addition; or pasteurized for 3.5 min at 64°C for (i) and (iii) and at 55°C for (ii); or both fermented and pasteurized as above, initial pH being maintained by addition of NH<sub>4</sub>OH solution. Contents of SH-groups in control and treated (i)-(iii) samples were determined by the method of Sedlak & Lindsay [*Analytical Biochemistry* (1968) 25, 192]. The results are tabulated, and statistically evaluated. It is concluded that fermentation denatured (ii) proteins, with increase in SH-group content, but had virtually no effect on (i) and (iii); and that the pasteurization regime applied caused only slight denaturation of (i)-(iii). [See also following abstr.] SKK

## 83

[Changes in SH-groups of hens' eggs during freeze-drying and storage.]

Bakalivanov, S.; Tsvetkov, Ts.; Bakalivanova, T.; Mitkov, S.

*Khranitelna Promishlenost* 28 (8) 14-16 (1979) [18 ref. Bg]

(i) fermented and pasteurized egg white, (ii) pasteurized egg yolk, (iii) pasteurized mixture of white and yolk, and (iv) fermented and pasteurized mixture, all prepared as described in the preceding abstr. were freeze-dried by freezing at -30°C, sublimation at -25° to -30°C, and final drying at 30-35°C for 8-10 h, the whole process lasting 24-30 h. Freeze-dried (i)-(iv) samples were stored in polyethylene sachets at 0-4°C and 50-55% RH or at room temp. (about 20°C) and corresponding RH, and were examined directly and after storage for 3, 6, 9 and 12 months, in comparison with freshly freeze-dried controls, as described in the preceding abstr. The results are tabulated and statistically evaluated. Freeze-drying of (i)-(iv) had no effect on SH-groups; fermentation increased storage life of freeze-dried products to > 6 months. At room temp., a slight decrease in SH-group content occurred during storage, less marked in (i) and (iv) than in (ii) and (iii). At 0-4°C, a slight increase in SH-groups occurred in (i)-(iii). No change in pH occurred in (i)-(iv) during freeze-drying, or in (i), (ii) and (iv) during storage, but it increased in (iii) during storage. SKK

## 84

[Effects of growing diets on growth, feed utilization and egg production in hens.]

Kolstad, N.; Hvidsten, H.; Bjornstad, J.

*Meldinger fra Norges Landbrukshøgskole* 59 (8) 35pp (1980) [33 ref. No. en] [Inst. for Fjørte & Pelsdyr, Norges Landbrukshøgskole, As-NLH, Norway]

A total of 3400 chicks of 2 laying hen strains was used in studies to evaluate effects of 4 growing diets differing in metabolizable energy, protein and vitamin contents on growth, feed utilization and subsequent laying performance and egg quality; 3 laying diets differing in composition were also evaluated. Tables of results are given, including data for shell quality (sp. gr.), albumen height and yolk colour. The results show significant differences between the 2 strains for shell quality and yolk colour, but not albumen height. The 4 growing diets studied had little effect on egg quality, except that egg wt. was highest for hens receiving the growing diet with the lowest protein and metabolizable energy contents. Laying diet significantly influenced yolk colour, but had little effect on shell quality or albumen height. AJDW

## 85

Dietary chromium and interior egg quality.

Jensen, L S.; Maurice, D. V.

*Poultry Science* 59 (2) 341-346 (1980) [17 ref. En] [Dep. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

Effects of supplementing a corn/soy diet with Cr, V and other ingredients on interior egg quality of caged layer hens were investigated. Although including 10 p.p.m. Cr or 10% distillers dried grains with solubles (DDGS) significantly increased Haugh units in one experiment, no significant improvement was obtained

by adding Cr to the basal diet in 4 subsequent experiments, nor did DDGS show an improvement when included as a treatment in one of the latter experiments. In the first experiment, a combination of Cr and DDGS gave no further improvement in interior egg quality. V significantly reduced Haugh unit values, but the marked deterioration of albumen quality caused by adding 10 or 20 p.p.m. V was significantly counteracted by adding Cr to the diet in all experiments. The effect of dietary Zn on Haugh units was not consistent. The results of these studies demonstrate that Cr is effective in counteracting the deleterious effect of V on interior egg quality and indicate that Cr may be essential for maintenance of the normal physical state of egg albumen. AS

## 86

### Important characteristics of modern breeds of chicken. I. Egg type breeds.

Singh, B. P.; Devroy, A. K.; Sharma, R. P.  
*Poultry Guide* 16 (11) 67-69 (1979) [En] [Indian Vet. Res. Inst., Izatnagar, Uttar Pradesh, India]

## 87

### A study on the combining ability of four egg laying strains.

Pal Singh, R.; Jitendra Kumar; Balaine, D. S.  
*Haryana Agricultural University Journal of Research*  
10 (2) 303-308 (1980) [13 ref. En] [Dep. of Anim. Breeding, Haryana Agric. Univ., Hissar, India]

A  $4 \times 4$  full diallel cross experiment was used to study general and specific combining activity and reciprocal traits of commercial poultry strains, and the quality of the eggs thus produced. Genetic results tabulated are age at first egg lay, feed efficiency, daily feed consumption and daily rate of lay. Egg quality traits measured were egg wt., shape index, Haugh units, yolk index, shell thickness and yolk colour and combining ability and reciprocal traits of each strain/cross involved. Differences due to general combining activity were significant for egg wt., shape index and Haugh units, and those due to specific combining ability were significant for egg wt. and yolk colour. Reciprocal effects were significant for shape index only. Additive gene action was generally important for egg wt., shape index and Haugh units and non-additive action was important for egg wt. and yolk colour only. Details of the results are discussed. LH

## 88

### [Studies on the nutritive values of locally produced calcium-phosphate supplements. III. Effect of various calcium-phosphorus supplements on the performance of laying hen.]

Han, I. K.; Shon, K. S.; Choi, Y. J.; Kim, C. S.  
*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 22 (3) 227-234 (1980) [25 ref. Ko, en] [Coll. of Agric., Seoul Nat. Univ., Suweon, Korea]

200 laying Leghorn hens were fed 5 different diets i.e. a control diet, tricalcium phosphate supplemented diets from 2 commercial plants, a dicalcium phosphate diet and a bone ash diet, over a period of 24 wk. The effects

on feeding parameters and eggs laid by these hens were examined. The various sources of Ca and P had no effect on egg production rate, size, shell thickness, chemical composition, number of shell-less eggs or overall performance of laying hens. [From En summ.] LH

## 89

### Behaviour of enterococci in egg processing operations.

Imai, C.  
*Poultry Science* 59 (8) 1767-1772 (1980) [12 ref. En] [Lab. of Q.P. Corp., Sengawa-cho, Chofu-shi, Tokyo 182, Japan]

Since enterococci were detected in dried and frozen egg products (whole egg and egg yolk), the origin of the enterococci and their behaviour in the different stages of egg processing were surveyed. A survey of unwashed and washed eggs, gathered from several parts of Japan, showed the presence of an average of 60 enterococci/egg on the shell surface of unwashed eggs. Smaller numbers of enterococci were detected on the shell surface of washed eggs. Most of the detected enterococci were *Streptococcus faecalis* and *S. faecalis* var. *liquefaciens*. The contents of 2 of 120 eggs were contaminated with enterococci. Enterococci were destroyed to some extent by the disinfectants used for washing the shell eggs, but they seemed to have greater resistance than *Escherichia coli* and *Pseudomonas fluorescens* used for comparison. In whole egg and egg yolk, enterococci grew rapidly at 25°C, slowly at 10°C, and very slowly at 2.5°C. The frozen storage of both whole egg and egg yolk at -20°C for 3 months only slightly decreased the number of enterococci. Counts of enterococci were decreased only slightly by normal pasteurization but were destroyed during desugaring by the glucose oxidase method. Enterococci counts were only slightly decreased by spray-drying whole egg and yolk. Considering these characteristics of enterococci, it appears to be difficult to produce enterococci-free egg products in a normal production line. AS

## 90

### Albumen quality of eggs laid during molt induction.

Nordstrom, J. O.  
*Poultry Science* 59 (8) 1711-1714 (1980) [11 ref. En] [Dep. of Anim. Sci., W. Washington Res. & Extension Cent, Washington State Univ., Puyallup, Washington 98371, USA]

2 experiments were conducted on 63 wk old Single Comb White Leghorn laying hens to determine the albumen quality of eggs laid during moult induction and those laid immediately upon resumption of lay following the moult. The first experiment utilized 1165 laying hens in group cages with 5-6 hens/cage. Light was restricted from 16 h light/8 h dark to 8 h light/16 h dark, beginning 16 days prior to feed withdrawal. Feed was withheld for 7 days, with water available ad lib., followed by feeding grain or a 12% protein mash for 21 days. All hens were then fed their normal laying ration and light regime was restored to 16 h light/8 h dark. The second experiment utilized 588 laying hens in individual cages. Light was restricted to 8 h light/16 h dark for 6 days, beginning on the first day of moult

## 93

**High performance liquid chromatographic determination of aflatoxins in animal tissues and products.**

Gregory, J. F., III; Manley, D.

*Journal of the Association of Official Analytical Chemists* 64 (1) 144-151 (1981) [28 ref. En] [Food Sci. & Human Nutr. Dep., Univ. of Florida, Gainesville, Florida 32611, USA]

A method was developed for detn. of aflatoxins M<sub>1</sub>, B<sub>1</sub>, G<sub>1</sub>, B<sub>2</sub>, and G<sub>2</sub> in animal tissues, meat, eggs, and dairy products by HPLC. Previous extraction procedures were modified to optimize the precision and recovery of the method. HPLC is performed isocratically with a 5 µm microparticulate octadecylsilica column and fluorometric detection. Analysis is based on treatment of the purified sample extract or standard with trifluoroacetic acid (TFA) to catalyse the hydration of aflatoxins M<sub>1</sub>, B<sub>1</sub>, and G<sub>1</sub> to the highly fluorescent M<sub>2a</sub>, B<sub>2a</sub>, and G<sub>2a</sub> derivatives. Analysis by HPLC with and without TFA treatment of the extract provides quantitative and qualitative data. Recovery of added aflatoxins and the precision of the recovery depend on the type of sample: mean coeff. of variation for all recovery values was 19.7 ± 11.0% for the analysis of liver, ground beef, dairy products [milk, yoghurt] and eggs. The method was sensitive, with a detection limit of 0.05-0.10 ng/g for each aflatoxin. This procedure provides an alternative to existing TLC methods for determining aflatoxins in animal tissues and products. AS

induction. A moult was induced either by feed withdrawal for 6 days or by feeding laying mash containing 20 000 p.p.m. Zn (as ZnO) for 6 days. Water was available ad lib. All hens then were fed their normal laying ration. In both experiments, albumen quality (Haugh units) increased dramatically in the eggs laid during moult induction, appearing as early as the second day after feed withdrawal. In eggs laid immediately following the moult, albumen quality was better than that observed just prior to moult induction but was not as good as that seen in eggs laid during moult induction. AS

## 91

**Production and carcass characteristics of White Leghorn pullets fed conventional or step-up protein diets.**

Leeson, S.; Summers, J. D.

*Poultry Science* 59 (8) 1839-1851 (1980) [5 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Day-old Single Comb White Leghorn pullets of a commercial strain were reared to maturity on a conventional dietary programme or a step-up protein regime. (12% crude protein 0-12 wk, 16% 12-16 wk, 19% 16-20 wk). For each treatment, body wt. and feed intake were obtained at 14 day intervals for 5 replicate cages of 10 birds each. At these times, 5 birds housed in adjacent cages were killed and numerous carcass and visceral characteristics recorded. At 19 wk of age, all birds were moved to laying cages and offered a single laying diet. Observations were continued to 30 wk of age, together with records of egg production and egg wt. All carcass and offal samples were analysed for moisture, crude protein, and ether extractable fat. Birds reared on step-up protein diets were smaller in body size at point-of-lay and this effect was associated with reduced absolute and proportional quantities of fat and protein deposition, with this difference being maintained through early egg production to around 24 wk of age. The data were presented as a base for investigators involved in systems production and related modeling techniques. AS

## 92

**Statutory food controls exercised by the Department of Agriculture.**

O'Toole, T.

*IFST Proceedings* 13 (3) 207-211 (1980) [En]

Scope of controls exercised by the Department of Agriculture in the Irish Republic in accordance with relevant domestic or EEC regulations are briefly described for the following individual food categories: dairy produce; fruit and vegetables; potatoes; poultry and eggs; and fresh meat and meat products. DIH

## 95

[Studies on analysis of chloramphenicol in livestock products.]

Aikawa, K.; Chikuma, G.

*Bulletin of National Institute of Animal Industry [Chikusan Shikenjo Kenkyu Hokoku]* No. 36, 135-144 (1979) [4 ref. En. ja]

Analytical procedures utilizing HPLC were developed for determining chloramphenicol (CP) in

milk, meat and eggs. Samples of pork (homogenized with water), milk and eggs were contaminated with CP at levels of 1 and 10 µg/ml; uncontaminated samples served as controls. Prior to analysis, the egg samples were dehydrated with anhydrous Na<sub>2</sub>SO<sub>4</sub> and then ground to a fine powder; this procedure facilitated subsequent extraction of CP by increasing the surface area. The analytical procedure for all samples basically involved extraction with ethyl acetate, evaporation of the extract in vacuo to remove ethyl acetate, dissolving the residue in n-hexane and extracting with water, concn. of the aqueous phase at 40°C under reduced pressure, membrane filtration of the concentrate and HPLC of the filtrate. HPLC involved use of a μBondapack column, a mobile phase of 30% methanol, a flow rate of 1.5 ml/min, UV detection at 280 nm, an injection vol. of 50 µl, and a chart speed of 3 mm/min. Chromatograms obtained with an authentic standard sample of CP and with the contaminated and control samples are included. Calibration curves of peak height against CP concn. indicated a linear relationship in the range 1–100 µg CP/ml. For milk, meat and eggs contaminated with 10 µg CP/ml, % CP recovery by the above technique was, resp., 97.8 ± 1.6, 87.9 ± 2.0 and 89.5 ± 2.6; corresponding results for samples contaminated with 1 µg CP/ml were 97.0 ± 1.4, 81.5 ± 2.3 and 87.9 ± 2.3. Factors affecting CP recovery from eggs are discussed. JA

## 96

**Accuracy and specificity of the dinitrobenzenesulfonate methods for available lysine in proteins.**

Holguin, M.; Nakai, S.

*Journal of Food Science* 45 (5) 1218–1222 (1980)  
[29 ref. En][Dep. of Food Sci., Univ. of British Columbia, Vancouver, British Columbia V6T 1W5, Canada]

Specificity of the dinitrobenzenesulphonate (DNBS) method for the ε-amino group of lysine was investigated using α- and ε-formyl lysines, L-lysine, L-lysyllysine, L-lysylalanine, and ribonuclease-S-peptide. Some reactivity of DNBS with α-amino group remained for N-terminal lysines that decreased as the chain length of peptides increased, so reasonable values can be expected for the available lysine in proteins. Availability of lysines in casein, lysozyme, β-lactoglobulin, acid solubilized gluten and whole egg was determined by the fluorodinitrobenzene (FDNB) method, the trinitrobenzenesulphonate (TNBS) method and the pepsin pancreatin digestion test and compared with the DNBS method. Good agreement was obtained among the values of available lysine when determined by the FDNB, TNBS, and DNBS methods. The results of the DNBS method indicated highly significant correlations with those of the FDNB and TNBS methods and the enzymic test. However, the TNBS method had significantly poorer repeatability. The DNBS method was the simplest and quickest method with reasonable accuracy. IFT

## 97

**Towards better quality fish, meat, poultry and processed products therefrom. [Review]**

Moorjani, M. N.

*Journal of Food Science and Technology, India* 17 (1/2) 49–54 (1980) [128 ref. En][Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Aspects covered in this review include: work done in India on microbiology and preservation of fresh fish and preparation of different products from fish, including waste utilization; preservation methods for meat, various products prepared from it and modernization of slaughterhouses; processing of poultry, and the various products obtained therefrom; and preservation and processing of eggs. CFTRI

## 98

**Salmonella in "Grade Cracks" shell eggs.**

D'Aoust, J. Y.; Stotland, P.; Randall, C. J.

*Canadian Institute of Food Science and Technology Journal* 13 (4) 184–187 (1980) [17 ref. En, fr][Bureau of Microbial Hazards, Health & Welfare Canada, Tunney's Pasture, Ottawa, Ontario K1A 0L2, Canada]

39 (13%) of 299 samples of "Grade Cracks" shell eggs and 13 (34%) of 40 egg wash-water samples obtained from 11 egg-grading stations in Ontario were found to contain *Salmonella*; *S. infantis* was isolated frequently from shell eggs but was not detected in wash-water samples. Standard plate counts (35°C) ranged from <10<sup>4</sup>–10<sup>8</sup> cells/ml wash-water. *Salmonella* was also detected in 1 of 13 egg content samples obtained from cracked eggs and in 2 of 94 intact shell egg samples. Following pre-enrichment in nutrient broth, tetrathionate brilliant green enrichment broth in combination with bismuth sulphite or brilliant green sulfa agar media identified 98% and 91%, resp., of all positive samples; homologous selenite cystine combinations were substantially less productive. The wide distribution of *Salmonella* in the egg-grading station environment underlines the need for stringent hygienic control of in-plant operations to obtain shell eggs of high bacteriological quality. AS

## 99

**Studies on weight and measurements of eggs in White Leghorn birds during advanced stage of lay.**

Mahto, B.; Singh, C. S. P.; Mishra, H. R.; Sharma, B. D.

*Indian Journal of Poultry Science* 15 (4) 268–270

(1980) [7 ref. En][Dep. of Anim. Breeding, Ranchi Vet. Coll., Ranchi-834 007, India]

The dimensions, and wt. and % of shell, albumen and yolk of eggs laid by (i) hens selected for egg production performance and (ii) non-selected hens were determined. Width of eggs laid by (ii) hen was significantly greater than that of eggs laid by (i) hens. The % yolk, shell and albumen did not differ significantly between (i) and (ii) eggs. Egg wt. was significantly correlated with all egg measurements, and wt. of egg components; egg length was significantly correlated with egg width. CFTRI

**100**

**Gamma-HCH in eggs and poultry arising from exposure to thermal vaporisers.**

Fishwick, F. B.; Hill, E. G.; Rutter, I.; Warre, P. R.  
*Pesticide Science* 11 (6) 633-642 (1980) [19 ref. En]  
 [MAFF Pest Control Lab., Cornhill, Liverpool L1 8JJ, UK]

Levels of  $\gamma$ -HCH were determined in poultry tissue (breast, leg, liver) and eggs taken from poultry houses in which thermal vaporisers were operated. During continuous operation for 14 months, residue levels in both substrates were closely related to changing levels of insecticide in the vaporiser; up to 46 mg/kg (on a fat basis) was found in tissue, and up to 4.0 mg/kg (on a whole liquid basis) in eggs. Where the vaporisers were operated discontinuously, max. levels were 6.7 mg/kg in tissue and 0.53 mg/kg in eggs. AS

**101**

**Absence of mutagenic-response from extracts of Maillard browned egg albumin.**

Pintauro, S. J.; Page, G. V.; Solberg, M.; Lee, T.-C.; Chichester, C. O.  
*Journal of Food Science* 45 (5) 1442-1443 (1980)  
 [12 ref. En] [Dep. of Food Sci. & Tech., Nutr. & Dietetics, Univ. of Rhode Island, Kingston, Rhode Island 02881, USA]

The mutagenicity of a Maillard browned egg albumin/glucose mixture was evaluated using the *Salmonella*-mammalian microsome plate assay. 3 parts of egg albumin were mixed with 2 parts glucose and the moisture content adjusted to 15%. The mixture was browned by storage at 37°C and 68% RH for 0, 20, or 40 days. The samples were fractionated into lipid-soluble and water-soluble components and each fraction was tested for mutagenicity. No mutagenic response was observed in any of the samples tested. IFT

**102**

**[Effects of the feeding of iodine additives to hens on laying performance and egg quality.]**

Nakajima, T.; Moriwaki, K.; Okano, K.  
*Japanese Poultry Science [Nihon Kakin Gakkai-shi]*  
 17 (2) 83-87 (1980) [10 ref. Ja, en] [Fac. of Agric., Shiga Prefectural Junior Coll., Kusatsu City, Japan]

This experiment was conducted to determine the effects of the feeding of 3 different types of organic or inorganic iodine additives on the contents of iodine and cholesterol in eggs, and egg production in layers. The iodine content in yolk increased rapidly 4 days after the feeding of the additives. 9-11 days later it reached max. levels (19-23  $\mu$ g) which were about 60-70 times greater than those of the control group, and were maintained during the feeding of the additives. When the feeding of the additives was suspended, the iodine content in yolk decreased sharply 5 days later, almost reaching the same levels as those of the control group 9 days later. The iodine content in albumen also increased gradually reaching max. levels (0.6-1  $\mu$ g) 5 days after the feeding of the additives. It reached to the same levels as those of the control group 4 days after suspending the feeding of the additives. It is suggested that iodine fed additionally

to layers is accumulated both in yolk and albumen, but the degree of the accumulation is much higher in yolk than albumen. There was no difference in iodine accumulation in the eggs among the 3 different types of iodine additives used. The content of cholesterol in yolk and laying performance were no affected by the additives. AS

**103**

**[Effects of addition of methylmercuric chloride to broiler and laying hen diets on performance of the birds and residues in the tissues and eggs.] Der Einfluss von Methylquecksilberchlorid-Zusätzen zum Broiler- und Legehennenfutter auf die Leistungen der Tiere und auf Rückstandsgehalte in den Geweben und den Eiern.**

Nezel, K.; Vogt, H.; Matthes, S.  
*Archiv für Geflügelkunde* 44 (6) 266-271 (1980) [3 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Bundesanstalt für Landw. Braunschweig-Volkenrode, 3100 Celle, Federal Republic of Germany]

Groups of broilers, 7 wk of age at the start of the trial, were fed diets with 0.25, 5, 10, 20 or 40 p.p.m. methylmercuric chloride (MMC), for 6 wk. Mortality during this 6 week period ranged from 3% for control birds to 67% for those receiving 20 p.p.m. MMC and 100% for those receiving 40 p.p.m. MMC. Data are included for Hg concn. in tissues (fat, skin, bone, muscle, kidney, liver) of the broilers. Hg concn. increased with increasing dietary MMC level, to max. values of 20 p.p.m. in muscle, 82 p.p.m. in kidneys and 81 p.p.m. in liver. Laying hens (210 days of age at the start of the experiment) were fed diets with 0, 5, 10 or 20 p.p.m. MMC for 30 wk. 10 p.p.m. MMC gave 67% mortality within 75 days; 20 p.p.m. MMC gave 100% mortality within 23 days. Even 5 p.p.m. MMC adversely affected shell strength. Data are also given for Hg concn. in tissues and eggs; max. recorded Hg concn. in egg fractions were: albumen 93, yolk 5.8 and shell 8 p.p.m. AJDW

**104**

**[Utilization of non-protein N and N requirements of the laying hen.]**

Bergaoui, R.; Fontaine, G.; Groote, G. de;  
 Moermans, R. J.  
*Archiv für Geflügelkunde* 44 (6) 242-251 (1980)  
 [34 ref. Fr, en, de, ru] Rijkscent. voor Landbouwkundig Onderzoek, Ghent, Belgium]

Groups of White Hisex and Warren SSL laying hens were used in studies on effects of dietary non-protein N on laying performance and egg quality. Diets studied included a 15% protein control diet, a 12.9% protein based diet, fed alone or with various combinations of amino acids and diammonium citrate; and a 10.9% protein semisynthetic diet, fed alone or with added urea, diammonium citrate on glutamic acid + glycine. Tables of results are given, including data for egg wt., shell deformation value and Haugh score of the eggs. The results are discussed in detail. Little effect of diet on egg quality was observed, except that eggs laid by hens fed the 10.9% protein basal diet + non-protein N tended to have higher shell deformation values and Haugh scores than those fed the control diet or either basal diet without non-protein N. AJDW

**105**

**The use of non protein nitrogen in the nutrition of the light hybrid laying hen.**

Bergaoui, R.; Fontaine, G.; Groote, G. de; Hendrickx, H. K.

*Archiv für Geflügelkunde* 44 (5) 207-213 (1980)  
[37 ref. En, de, fr, ru] [Rijkssta. voor Kleinveeteelt, Burg van Gansberghelaan 92, 9220 Merelbeke, Belgium]

1092 Hisex White light strain pullets, 22 wk of age at the start of the experiment, were used in a feeding trial conducted to evaluate effects of partial substitution of non-protein N for dietary protein on growth, laying performance and egg quality. The control diet contained approx. 15% protein; the experimental diets had approx. 2.5% of protein replaced by non-protein N (urea, diammonium hydrogen citrate, glutamic acid + glycine, diureidoisobutane); some also contained bacitracin, flavomycin, urease or NaHCO<sub>3</sub>, to test effects of these on utilization of non-protein N. A basal diet had approx. 12.5% protein, with no non-protein N. Tables of results are given, including data for the egg production, egg wt., egg shell deformation value and Haugh score of the eggs. The results show that neither non-protein N nor the other variables studied improved the performance of hens fed the low-protein diets.

AJDW

**106**

**Production traits of caged layers as influenced by their dietary protein and energy levels.**

Reddy, G. V.; Reddy, C. V.; Reddy, V. R.

*Indian Journal of Animal Sciences* 50 (9) 748-752 (1980) [14 ref. En] [Coll. of Vet. Sci., Andhra Pradesh Agric. Univ., Rajendranagar, Hyderabad, Andhra

Pradesh 500 030, India]

288 Hy-line commercial pullets were split into groups and fed diets with 4 protein levels (12, 14, 16 and 18%) each having 4 metabolizable energy levels (2540, 2640, 2740 and 2840 kcal/kg), in triplicate for ten 28 day periods. Feed and water were provided ad lib. Test criteria (subjected to statistical analysis) were % hen-day egg production, average feed consumption and efficiency, and egg quality. Egg wt. decreased at the highest energy and lowest protein levels (being 52.8 g from this combination diet). Increasing levels of dietary protein resulted in decreased albumen and yolk quality, as measured by albumen index, Haugh units and yolk index. Increased dietary energy improved albumen quality, with no effect on yolk. Protein × energy interactions were significant for all traits, 18% protein and 2540-2640 kcal/kg energy giving optimal performance. LH

**107**

**[Trends in specialization in poultry industry plants, with particular reference to egg processing.]**

Stefanik, I.

*Hydinarsky Priemysel* 22 (9/10) 371-376 (1980) [Sk]  
[Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

**108**

**Role of nutrition on egg quality.**

Narahari, D.

*Poultry Guide* 17 (12) 51-54 (1980) [En] [Dep. of Poult. Sci., Madras Vet. Coll., Madras, Tamil Nadu, India]

The diet of a laying hen influences flavour, shell quality, and yolk pigmentation to a greater extent than it does the albumen index, Haugh unit score, yolk index, and incidence of blood spots and of meat spots in eggs. CFTRI

**109**

**[Effects of dietary rapeseed meal, choline and betaine on the incidence of tainted eggs.] Der Einfluss von Raps, Cholin und Betain auf die Häufigkeit des Auftretens von Riecheiern.**

Willeke, H.

*Archiv für Geflügelkunde* 44 (6) 272-275 (1980) [5 ref. De, en, fr, ru] [Lehrstuhl für Tierzucht, Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

Groups of brown-egg laying hens were used in a 3-wk feeding trial conducted to evaluate effects of feeding a basal diet (i) alone, (ii) with addition of 30 g rapeseed meal/kg, (iii) with addition of 500 mg choline chloride/kg, or (iv) with 250 mg betaine/kg. Eggs laid in the 3rd wk of the feeding trial were tested for taint. Tables of results are given. A total of 557 eggs was evaluated. The % tainted eggs were: (i) 0.6%; (ii) 10.8%; (iii) 9.6% and (iv) 5.4%. Incidence of taint did not differ significantly between groups (ii), (iii) and (iv). Genetic aspects of susceptibility of hens to production of tainted eggs are briefly considered. AJDW

**110**

**[National Food Administration Ordinance establishing delay periods before marketing of foods derived from domestic animals treated with drugs.]**

Sweden, Statens Livsmedelsverk

*Statens Livsmedelsverks Förfatningssamling SLV* FS 1981:1, 11pp. (1981) [Sv]

This Ordinance specifies min. delay periods after cessation of treatment for marketing of meat (beef, pork, lamb, horse meat, poultry), milk or eggs from animals treated with a wide range of veterinary drugs. Examples of approved forms to be issued by the veterinary surgeon prescribing the treatment are given: these show the identity of the animal, the drug used, method and/or site of administration, the date of treatment, and the necessary delay period before marketing of meat, eggs or milk from the treated animal. AJDW

**111**

**[Sources of nitrosamines in foods of animal origin.]**

Juszkiecicz, T.

*Medycyna Weterynaryjna* 34 (7) 412-415 (1978) [8 ref. Pl] [Zakład Farmakologii i Toksykologii Inst. Weterynarii, Pulawy, Poland]

Aspects considered in this discussion of sources of nitrosamines in meat, poultry, fish, eggs and milk include de novo formation of nitrosamines in the gastrointestinal tract of the animal (with reference to the importance of the nitrate and nitrite content of the feed), and transfer of preformed nitrosamines from the feed to the edible tissues or milk. AJDW

112

[Studies on polychlorinated biphenyls in Switzerland.] [Review]

Schweizer, C.; Tarradellas, J.

*Chimia* 34 (12) 509-519 (1980) [33 ref. Fr, en] [Ecole Polytechnique Federale, CH-1015 Lausanne, Switzerland]

The current state of research on polychlorinated biphenyls (PCB) in Switzerland is reviewed. Tabulated data are presented on PCB residues in fish from Swiss lakes and rivers as well as birds, eggs, foods and human adipose tissue, serum and milk. RM

113

[Studies on the agricultural chemical residues in foods. XIII. Organochlorine pesticide residues in meats and fishes produced in Hokkaido in 1976-1977.]

Yamamoto, I.; Nishizawa, M.; Sato, Y.

*Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho]* No. 29, 44-48 (1979) [4 ref. Ja]

Organochlorine pesticide residues in several foods were measured in this survey of samples produced and sold in Hokkaido in 1976-1977. BHC and DDT total residues, dieldrin, endrin and heptachlor epoxide residues were determined in pork, chicken, hens eggs and 24 fish and marine products (including shrimp, scallop, *Lipsetta obscura*, *Clupea pallasi*, *Gadus macrocephalus* and *Oncorhynchus masou*). [From tables] [See *Report of the Hokkaido Institute of Public Health*, (1978) No. 28, 63-68.] LH

114

Utilizing waste activated sludge for animal feeding.

Beszedits, S.

*Feedstuffs* 53 (14) 25-26 (1981) [En] [B & L Information Services, Toronto, Ontario, Canada]

Large quantities of activated sludge wastes are available for disposal, which can be incorporated in livestock feeds for pigs, cattle and poultry. Protein content of dried sludge is 25-40%, and it contains good amounts of essential amino acids, vitamins (particularly B<sub>12</sub>) and minerals. It can provide a partial replacement for expensive feeds, e.g., soymeal, fish meal. Major possible disadvantages are the presence of heavy metals, or pesticides; quantities of these are usually low in waste waters from food industries and amounts added to diets are usually low for other reasons.

Suitable waste waters have been utilized from breweries, slaughterhouses, dairies, citrus fruit processing and potato processing. Chemical and paper industry wastes are unsuitable. Traces of Co (max. 3 µg/l) stimulate vitamin B<sub>12</sub> production; this can be enhanced by incorporation of *Propionibacterium freudeureichii*, particularly if dairy wastes are present. Additions of ≤ 2.5% dried sludge in poultry diets have no effect on flavour of either the meat or the eggs, and flavour of fish (carp) is unaffected by 0.2% sludge concn. in the water. Additions of ≤ 9% can be made to cattle diets without any effect on carcass quality. ELC

115

[Inspection of retail sale premises for foods of animal origin. Technical notes. Eggs. Freshwater and marine fish.]

Jouve, J.-L.; Rozier, J.; Adroit, J.; Boutet, P.; Cazaillet, M.; Lagoin, Y.; Mailly, P.; Olry, J.; Quinet, G.; Rigoulet, J. *RTVA* 19 (158) 41-49 (1980) [Fr] [Ecole Nat. Vet., Alfort, France]

Technical notes are given on requirements concerning quality etc. of eggs, and of marine and freshwater fish. Aspects considered include: presentation and packaging; storage temp. and max. shelf-life; labelling; processing and preparation; quality and wt. requirements and grading; composition; microbiological quality requirements; and defects. A scheme for evaluation of freshness of fish is described. AJDW

116

Decreased proteolysis of alkali-treated protein: consequences of racemization in food processing.

Hayashi, R.; Kameda, I.

*Journal of Food Science* 45 (5) 1430-1431 (1980) [16 ref. En] [Res. Inst. for Food Sci., Kyoto Univ., Uji, Kyoto 611, Japan]

When proteins (pancreatic ribonuclease A, hen egg lysozyme, the acidic fraction of soybean protein, and casein) dissolved in 0.2N NaOH in tritiated water were allowed to stand at 40°C, pepsin digestibility extensively decreased in the initial stage in which tritium-H<sub>2</sub> exchange and lysinoalanine formation increased. This decrease is caused by racemization of small amounts of the amino acid residue. JFT

117

Feeding value of sunflower- and groundnut-cakes for laying hens.

Singh, K. S.; Prasad, C. M.; Brahmakshatriya, R. D.

*Animal Feed Science and Technology* 6 (1) 63-71 (1981) [8 ref. En] [Dep. of Anim. Sci., G. B. Pant Univ. of Agric. & Tech., Pantnagar, Nainital, Uttar Pradesh, India]

This paper includes a description of a feeding trial in which Pantnagar Babcock Single Comb White Leghorn pullets were fed diets in which sunflower seed cake was substituted for 0, 50 or 100% of the groundnut cake. At each level of substitution, diets with 12, 14 or 16% protein were evaluated. Egg production and the wt., albumen height and yolk colour index were determined for each treatment; results are presented in tabular form. The sunflower seed cake diet gave significantly heavier eggs than the soybean meal diet, the mixed diet giving intermediate egg wt. The 16% protein diet gave significantly higher egg wt. than the 12 or 14% protein diets. Neither dietary protein level nor oilseed cake type significantly influenced albumen height or yolk colour index; however, a significant protein level/oilseed cake type interaction was observed for yolk colour. AJDW

**118**

Rapeseed meal and egg taint - the current situation.  
Fenwick, G. R.; Butler, E. J.; Pearson, A. W.  
*Poultry International* 19(9) 128 (1980) [En] [ARC  
Food Res. Inst., Colney Lane, Norwich, UK]

A brief summary is given of current knowledge concerning the relationship between dietary rapeseed meal and fishy taint of eggs. The taint is due to presence of trimethylamine in the eggs at a concn. of approx. 1 µ/g; the trimethylamine is formed by decomposition of sinapine present in the rapeseed meal. This presents a significant problem only in hens with an abnormally low capacity for synthesis of trimethylamine oxidase. Birds can be tested for ability to oxidize trimethylamine by injecting a small amount of <sup>14</sup>C-labelled trimethylamine, and detn. of the concn. of labelled trimethylamine oxide 20 min later. 5-vinyl-2-oxazolidinethione, which is formed by breakdown of one of the rapeseed glucosinolates, inhibits trimethylamine oxidase, and may contribute to taint development. Treatment of rapeseed meal to remove substance responsible for taint is discussed, together with the potential for breeding of rapeseed var. having low concn. of taint-inducing substances. AJDW

**119**

The effect of egg-shell cleanliness on the penetration rate of *Salmonella typhimurium*.

Miligy, M.

*Veterinary Medical Journal* 25, 473-479 (1977, publ. 1979) [38 ref. En] [Hygiene & Preventive Med. Dep., Fac. of Vet. Med., Ain Shams Univ., Zagazig, Egypt]

Studies were conducted on effects of cleaning of eggs on penetration of *Salmonella typhimurium* into the egg contents. 4 batches of eggs were tested: (i) uncleansed eggs; (ii) eggs washed in running water; (iii) eggs cleaned with dry metal wool; and (iv) eggs lightly cracked, without damage to the egg membranes. The eggs were dipped for 5 min in a 24-h culture of *Salm. typhimurium* ( $300 \times 10^6$  cells/ml) and held at either room temp. (25-28°C, RH 60-75%) or in a refrigerator (7°C, RH 85-90%). At intervals, samples of egg contents were taken, and salmonellae were determined by enrichment in tetrathionate broth and plating on MacConkey agar and brilliant green agar. The periods elapsing before detection of salmonellae in the egg contents were: at room temp. (i) 6 h, (ii) 4 h, (iii) 4 h and (iv) 30 min; and at 7°C (i) 18 h, (ii) 10 h, (iii) 10 h and (iv) 1 h. AJDW

**120**

Clean eggs.

Polach, M.

*Poultry International* 19(8) 100, 102, 104, 106-109, 114-116 (1980) [En, de, fr, it, es, ja, ar]

Cleanliness of eggs is discussed in relation to the likelihood of penetration of bacteria through the egg shell. Aspects considered include: structure of the egg shell; the higher bacterial count of shells of eggs produced by floor than by cage rearing systems; effects of the bacterial count of environmental air; contamination with droppings; effects of surface moisture on penetration of bacteria through the egg shell; contraction of egg contents as a result of cooling,

and consequent suction of bacteria through pores in the shell; adverse effects of washing of eggs; and spoilage of eggs at high ambient RH. Recommendations for minimization of bacterial contamination of egg shells are discussed. AJDW

**121**

[The Etablissements Liot plant at Pleumartin.]

Anon.

*RTVA* 19(160) 54-57 (1980) [Fr]

The Societe Liot egg-processing plant at Pleumartin, Vienne, France is described, with reference to: reception of eggs; sorting and separation of eggs to be marketed in-shell; cleaning; breaking; separation of yolk from albumen; pasteurization; freezing of the pasteurized product; spray-drying; manufacture of 'Confidoeuf' low-<sub>w</sub> conc. liquid egg; automation; and quality control. AJDW

**122**

Studies on the development of an oil emulsion for the preservation of shell eggs.

Neelakantan, S.; Shanthy, A. P.

*Indian Food Packer* 33(4) 44-48 (1979) [17 ref. En]

[Dep. of Food Tech., Tamil Nadu Agric. Univ., Coimbatore, Tamil Nadu, India]

Studies were conducted to evaluate effects of spraying with an oil emulsion (containing 100 ml groundnut oil, 100 ml water, 1 ml triethylamine, 20 mg agromycin and 100 mg BHA) on the keeping quality of eggs. (i) control eggs were not sprayed; (ii) eggs were sprayed with the emulsion before storage for ≤ 4 wk. Wt. loss during storage was 4.7% for (i) vs. 0.6% for (ii). Air cell height increased to 12.1 mm in (i), vs. 4.5 mm in (ii). (ii) showed 27% thick albumen at the end of storage, vs. 0 for (i). Decreases in yolk index were slower for (ii) than for (i). pH (initially 8.4) increased to 9.45 for (i), 8.60 for (ii). Eggs treated by emulsion spraying were accepted by consumers; omelettes made from (ii) eggs were considered to have better texture, taste and smell than those made from (i) eggs. Costs of emulsion treatment are considered. CFTRI

**123**

Conveyor, in particular for eggs.

Capelleveen, P. van (Gebroeders van Capelleveen BV)

*United States Patent* 4 244 464 (1981) [En]

This conveyor comprises 2 lateral chains interconnected by a number of transverse bars forming the actual carrier surface. Successive bars are on different levels so that the upper surface of each second bar is on a higher level than the upper surface of the first bar. One advantage is that eggs resting on 2 bars can be transported over steeper rises without rolling backwards. AS

**124**

[Effect of adding avoparcin to the diet on the performance of laying hens.]

Keppens, L.; Groote, G. de

*Revue de l'Agriculture* 33(4) 857-870 (1980) [15 ref. Fr, en] [Min. de l'Agric., Cent. de Recherches Agron.-Gand, Burg. van Gansberghelaan 92, B-9220 Merelbeke, Belgium]

The effects of 5, 10, 20, and 40 mg avoparcin/kg of

feed on egg production and quality were investigated. Tabulated results showed no significant effects on egg white quality (Haugh units), shell deformation or yolk colour (Roche scale, % re-emission at 520 nm). No residue data are given. RM

## 125

The thiocyanate ion ( $SCN^-$ ) content of eggs from hens (*Gallus domesticus*) fed on a diet containing rapeseed meal.

Ahmed Shuaib, A. C.; Beswick, G.; Tomlins, R. I.  
*Journal of the Science of Food and Agriculture* 32 (4) 347-352 (1981) [28 ref. En] [Dep. of Applied Biol. & Food Sci., Polytechnic of the South Bank, Borough Road, London SE1 0AA, UK]

Abor Acre laying hens were fed a test diet containing 10% rapeseed meal to investigate whether  $SCN^-$  content of eggs could be increased by this means to obtain antimicrobial activity from the lactoperoxidase/ $SCN^-$ / $H_2O_2$  system. Rapeseed meal contained 4.1% glucosinolates. After 4 wk on the diet  $SCN^-$  content increased from 0.5 mg/kg eggs in controls to 1.6mg/kg. There was no significant difference between control and test diet eggs for taint, yolk colour or average wt. Egg production was increased approx. 15% by the test diet, and layers also lost wt. in comparison to those on control diets. The content of  $SCN^-$  achieved in eggs is stated to be sufficient for operation of the antimicrobial system. DIH

## 126

Studies on the recovery of *Salmonella typhimurium* from experimentally infected hen eggs.

Miligy, M.

*Veterinary Medical Journal* 25, 239-244 (1977, publ. 1979) [35 ref. En] [Dep. of Hygiene & Preventive Med., Zagazig Univ., Zagazig, Egypt]

Freshly laid eggs were washed thoroughly with saline solution, and their shells disinfected with 70% alcohol. Eggs were inoculated with a 24-h culture of *Salmonella typhimurium* ( $300 \times 10^6$  cells/ml) by one of 2 methods: (i) application of culture to the shell over an area of approx. 1 cm<sup>2</sup> at the air sac end of the egg; or (ii) injecting 1 ml culture into the egg contents, the hole in the shell then being sealed with wax. The inoculated eggs were then held at room temp. (28-35°C) at RH 60-75% for  $\leq 74$  days. At intervals during this period, samples of shell and egg contents were tested for salmonellae by enrichment in tetrathionate broth and plating on MacConkey agar and brilliant green agar. A table of results is given. *Salm. typhimurium* was found to survive for 26 days on the shell surface and for 72 days in the egg contents, under the conditions studied. These results are discussed in relation to the role of *Salmonella*-contaminated eggs as a cause of food poisoning. AJDW

## 127

[Biological detection of antibiotic residues in eggs.]

Konecny, S.

*Hydinarsky Priemysel* 22 (3/4) 115-126 (1980) [16 ref. Cs] [Statni Veterinarni Ustav, Ostrava, Czechoslovakia]

The undesirable sensitivity of bacterial strains used for bioassay of antibiotics to natural antimicrobial substances occurring in hen's eggs can be eliminated by preliminary heating of eggs to 100°C for 3 min. Following heat denaturation of these antimicrobial substances the residues of antibiotics can be determined with sufficient accuracy by using the FIL-IDF diffusion plate method and *Bacillus stearothermophilus* var. *calidolactis* C953 as the test strain. STI

## 128

[Influence of bacitracin zinc and flavomycin on transfer of vitamin A to the egg.]

Ferrando, R.; Palisse, M.; Jacquot, L.; Fourlon, C.  
*International Journal for Vitamin and Nutrition Research* 51 (1) 9-15 (1981) [4 ref. Fr, en] [Ecole Nat. Vet. d'Alfort, F-94704 Maisons-Alfort Cedex, France]

Laying hens of 2 breeds (Warren and Dekalb) were fed 3 diets comprising: (i) standard commercial poultry ration (composition given); (ii) diet (i) supplemented with 10 p.p.m. bacitracin; and (iii) diet (i) supplemented with 0.5 p.p.m. flavomycin. In a 1st laying trial under commercial conditions, 17 eggs from each of (i), (ii) and (iii) groups were examined for yolk wt., vitamin A content of yolk, and xanthophyll content of yolk. Mean vitamin A levels from (i), (ii) and (iii) resp. were (IU/g) Warren breed 25.7, 28.3 and 34.7 and Dekalb breed 25.3, 27.3 and 35.4. In a 2nd trial of 12 hens over 42 days, records were made of wt. of yolk, white and shell of eggs, and of % transfer of vitamin A to yolk from the diet. Mean contents of vitamin A/g yolk were (i) 26.5, (ii) 26.7, (iii) 29.4, and transfer from the diet was 5% higher in (ii) and (iii) than in (i). In hens killed after 42 days, vitamin A contents of blood serum and liver were slightly higher, but not statistically significantly, with the supplemented diets. Supplementation was an advantage, with flavomycin superior to bacitracin; in particular, the proportion of eggs containing 500-700 IU vitamin A in the yolk was increased. ELC

## 129

Method for the estimation of aflatoxins B<sub>1</sub> and G<sub>1</sub> in animal tissue.

Malik, M. A.; Shah, M. A.; Asghar, M. N.

*Pakistan Journal of Science* 31 (1/2) 102-106 (1979) [21 ref. En] [Dep. of Physiol. & Biochem., Univ. of Agric., Faisalabad, Pakistan]

The method involves methanol extraction of the sample, purification with chloroform, clean-up using silica gel chromatography, and TLC with isopropanol, acetone and chloroform (3:7:90) as solvents. Average recovery in beef muscle samples spiked with 0.3-0.7 µg aflatoxin B<sub>1</sub> and G<sub>1</sub>/kg was 49 and 77% for B<sub>1</sub> and G<sub>1</sub>, resp. The method can be applied to other animal tissues, milk and eggs. DMK

## 130

Mineral element composition of Finnish foods. VIII.  
Dairy products, eggs and margarine. [Lecture]  
Varo, P.; Nuurtamo, M.; Saari, E.; Koivistoinen, P.  
*Acta Agriculturae Scandinavica* Supplement 22, 115-  
126 (1980) [21 ref. En] [Dep. of Food Chem. & Tech.,  
Univ. of Helsinki, SF-00710 Helsinki, Finland]

33 commodities representing dairy products (milk powders, butter, cheese, cultured cream, yoghurt etc.), whole and low fat milk, margarine and eggs were collected, pretreated as necessary, and analysed for ash content and 25 mineral elements. Seasonal variations occurred in milk composition, but Se was generally low in dairy products and higher in eggs (which were rich in Fe). Dairy products had low heavy metal levels. Hg concn. was higher in eggs than in other commodities, but not at a level to cause concern. [See FSTA (1981) 13 10A606.] LH

## 131

Commercial egg industry: costs, practices and regional comparisons.

Jones, H. B., Jr.  
*Research Bulletin, Agricultural Experiment Stations, University of Georgia* No. 257, 39pp. (1980) [36 ref. En] [USDA Univ. of Georgia, Athens, Georgia 30602, USA]

This review examines the characteristics, costs and operating practices of US egg production and marketing firms, including marketing practices and functions, types of product and outlets, regional packing plant costs, economics of scale in egg packing plants, assembly and distribution costs. RM

## 132

[Agricultural chemical residues in foods. XIV.  
Pesticide residues in dairy products and meats and fishes produced in Hokkaido (Japan) 1978.]  
Hori, Y.; Shitara, Y.; Niiyama, K.; Saito, T.;  
Yamamoto, I.; Sato, Y.; Tankawa, Y.  
*Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho]* No. 29, 49-52 (1979) [6 ref. Ja]

In 1978 the following foods, produced and retailed in Hokkaido, Japan, were examined for their content of organochlorine pesticide residues (number of samples in brackets): milk (7), modified dried milk (1), butter (4), eggs (8), chicken (8), beef (2), pork (8) and 10 types of fish (14). The amount of pesticide residues found in milk, eggs and meat was small. Butter had high concn. of HCH, DDT and dieldrin (0.056-0.106, 0.010-0.036 and 0.003-0.017 p.p.m. resp.) and some fish contained large amounts of DDT (0.001-0.118 p.p.m.). Mean daily intakes of HCH, DDT and dieldrin, calculated from food survey data and the survey figures, were 0.6, 1.9 and 0.2 µg resp. These intakes of HCH and DDT were less than a third of those calculated from 1973 data; the estimated intake of dieldrin had not changed. More than 50% of the estimated intake of HCH in 1978 was contributed by dairy products and 50% of DDT intake was from fish; 39.1% of estimated dieldrin intake was from dairy products and 27.2% from fish. [See FSTA (1981) 13 9C320 for part XIII.] [See following abstr.]

## 133

[Agricultural chemical residues in foods. XV.  
Pesticide residues in dairy products, meats and fishes produced in Hokkaido, 1979.]  
Hori, Y.; Niiyama, K.; Saito, T.

*Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho]* No. 30, 41-45 (1980) [3 ref. Ja]

In 1979 the following foods produced and retailed in Hokkaido, Japan, were examined: milk (7), dried milk (1), butter (4), eggs (8), chicken (8), beef (2), pork (8), 12 types of fish (14). Compared with the previous year, HCH concn. in meat and milk was about the same, the concn. in dried milk was 3 times as high, and concn. in butter was half as high. There were no significant differences in total DDT concn. Butter had the highest concn. of dieldrin, 0.004 p.p.m. Only traces of endrin and heptachlor epoxide were detected. In fish no high residue concn. were detected; *Cupea pallasi* contained BHC 0.012 p.p.m., and several fish spp. contained DDT >0.010 p.p.m. [See preceding abstr.] BWH

## 134

[Polychlorinated biphenyls in foods. III.]

Hori, Y.; Shitara, Y.; Niiyama, K.; Saito, T.;  
Yamamoto, I.; Sato, Y.; Tankawa, Y.

*Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho]* No. 29, 74-77 (1979) [7 ref. Ja]

In 1978 the following foods, produced and retailed in Hokkaido, Japan were examined (number of samples in brackets): milk (7), modified dried milk (1), butter (4), eggs (8), chicken (8), beef (2), pork (8) and 10 types of fish (14). Fish contained the highest concn. of polychlorinated biphenyls (PCB) with 0.002-0.176 p.p.m. PCB concn. in milk and meat was low ( $\leq 0.010$  p.p.m.) and no PCB was detected in dried milk; average concn. in butter was 0.011 p.p.m. Average daily intake of PCB in Hokkaido in 1978 was estimated to be 3 µg of which 79.5% was contributed by fish, 7.6% by eggs, 7.1% by dairy products and 5% by meat. Estimated intake of PCB from meat was a third of that for 1973, but estimated total intake was unchanged. [See FSTA 13 5C169 for part II.] [See following abstr.] BWH

## 135

[Polychlorinated biphenyls in foods. IV.]

Hori, Y.; Niiyama, K.; Saito, T.

*Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho]* No. 30, 38-40 (1980) [5 ref. Ja]

In 1979 the following foods, produced and retailed in Hokkaido, Japan, were examined (number of samples in brackets): milk (7), modified dried milk (1), butter (4), eggs (8), chicken (8), beef (2), pork (8), 12 kinds of fish (14). Concn. of polychlorinated biphenyls (PCB) in meat and eggs was low (0.001-0.012 p.p.m.); modified milk contained average 0.031 p.p.m. but concn. in milk and butter, 0.002 and 0.018 p.p.m. resp., was similar to 1978. In fish the range of PCB concn. was 0.002-0.056 with the highest concn. in *Hexagrammus otakii*. [See preceding abstr.] BWH

**136**

[Process and apparatus for the sterilisation of food products or mediums.]

Hecquet, J.; Toque, J. (Burton-Corblin)

*French Patent Application* 2 442 018 (1980) [Fr]

Food products e.g. whole eggs, are subjected to very high hydrostatic pressures of 2000–4000 bar to make them sterile by destroying or inhibiting the growth of bacteria which may be contained in them. W&Co

**137**

Design, operation, and feasibility of a small on-the-farm egg grading and packing plant.

Harris, C. E.

*Marketing Research Report, USDA* No. 1112, 19pp. (1980) [5 ref. En] [Agric. Marketing Service, ARS, USDA, Beltsville, Maryland 20705, USA]

A recommended layout is described and illustrated for an on-the-farm egg-grading and packing plant for 35 cases/h. It was designed for efficient handling of the production from 108 000 hens, with capability for expansion for the production from 180 000 hens. The facilities described include the initial production houses, grading and packing rooms, cooler, and retail salesroom. Each area of the plant is discussed and methods of operation recommended. A cost/benefit analysis is included. RM

**138**

[Choice feeding of laying hens with mash diets and pelleted oats.]

Herstad, O.

*Meldinger fra Norges Landbrukshøgskole* 59 (24) 8pp. (1980) [10 ref. No. en] [Inst. for Fjørte og Pelsdyr, Norges Landbrukshøgskole, As-NLH, Norway]

420 White Italian (Nor-breed no. 32) laying hens, 18 wk of age at the start of the experiment, were used in a feeding trial conducted to evaluate effects of various mash/pelleted oat diets on laying performance and egg quality. Diets tested were: (i) mash (15.6% protein) ad lib.; (ii) mash as (i) + oat pellets ad lib.; (iii) mash with 21.1% protein + oat pellets ad lib.; (iv) mash as (iii), with 50 g oat pellets/day. Feed consumption and egg production and quality were evaluated until the hens were 59 wk of age. Tables of results are given. The data for egg quality show that (i) gave the highest and (iii) the lowest Roche colour fan score of the yolk. Linoleic acid concn. in the egg lipids was highest for (iii), lowest for (i). No significant effect of diet on sp. gr., albumen height or levels of other fatty acids in the egg lipids was observed. AJDW

**139**

Preservation of shell eggs with different coating agents.

Alvi, A. S.; Arshad, M.; Afzal, M.

*Pakistan Journal of Scientific and Industrial Research* 22 (6) 341–345 (1979) [12 ref. En] [PCSIR Lab., Lahore 16, Pakistan]

White Leghorn eggs were treated with 3, 6 or 9% chlorinated wax emulsion (preparation submitted for

Pakistan patent, 1979), carboxymethyl cellulose (CMC) or liquid paraffin, and stored for 42 days at 35°C. Effects of coating agents on total wt. loss, air space, yolk index and white index, determined at weekly intervals, are shown in tables. By all criteria, 6% and 9% wax emulsions gave the best results, the eggs retaining good quality throughout storage. 9% wax emulsion coating may protect the eggs for even longer periods. RM

**140**

Egg quality as affected by storage and handling methods.

Kamel, B.; Bond, C.; Diab, M.

*Journal of Food Quality* 3 (4) 261–273 (1980) [7 ref. En] [Kuwait Inst. for Sci. Res., PO Box 12009, Kuwait]

3 groups of 1500 eggs were treated as follows: (i) unwashed, (ii) washed and dipped in 50 p.p.m. chlorine solution for 5 s, or (iii) washed and oil treated at  $22 \pm 1^\circ\text{C}$  for 5 s. A set from each treatment was stored at  $5^\circ, 25^\circ, 37^\circ$  and  $42 \pm 1^\circ\text{C}$  at 75–80% RH for various times up to 75 days. Egg quality was determined from internal and external factors, and sensory quality was assessed. Egg wt. loss in (iii) was least (0.65% vs. 5.9 and 5.1% in (i) and (ii), resp.); refrigeration reduced wt. loss. Albumen pH was measured immediately in all broken eggs, and (iii) showed lower values (8.86 after 75 days at  $5^\circ\text{C}$ ); pH changes were higher at high storage temp. Haugh units, yolk index and yolk:albumen ratio all confirmed that (iii) was the most successful treatment for maintaining quality of eggs even after 19 days storage at  $42^\circ\text{C}$ . Lower holding times and temp. also helped control quality (all eggs stored at  $5^\circ\text{C}$  kept their high quality after 75 days). Sensory scores dropped drastically for eggs stored at  $37^\circ$  or  $42^\circ\text{C}$ , especially with (i) and (ii). LH

**141**

Stuck egg releasing machine.

Warren, W. H.

*United States Patent* 4 247 241 (1981) [En]

Machine is described for removing stuck eggs from egg trays comprising semi-flexible material with a series of depressions holding the eggs; plungers may be raised to push the eggs upwards and loosen them in the depressions. AS

**142**

Cheese flavored eggs.]

Ajinomoto KK

*Japanese Examined Patent* 5 542 818 (1980) [Ja]

Peeled boiled eggs are pickled in a mixture of koji prepared from rice and containing salt and ethanol, to impart a cheese-like flavour. IFT

**143**

A note on egg quality traits in White Leghorn strain cross.

Mondal, S. S.; Chakrabarti, S.; Khan, A. G.

*Indian Poultry Gazette* 64 (3) 101–103 (1980) [5 ref. En] [Coll. of Vet. Sci. & Anim. Husbandry, Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur, Madhya Pradesh – 482 004, India]

No significant differences for egg quality parameters

were estimated among 3 interstrain crosses of the White Leghorn breed. Significant correlations of egg wt. with Haugh unit score and albumen index were recorded for the P × M cross; the N × P cross showed a statistically significant correlation between shell thickness and Haugh unit score/egg wt. ratio. Albumen index and yolk index were significantly associated in the P × M and N × P crosses. CFTRI

## 144

[Comparative studies on physical and chemical properties of avian eggs. I. Proportion of component parts and chemical compositions of duck, muscovy duck, chicken and pheasant eggs.]

Tanabe, H.; Ogawa, N.

*Japanese Poultry Science [Nihon Kakin Gakkai-shi]* 16 (6) 329–336 (1979) [10 ref. Ja, en] [Dep. of Human Nutr. & Food Sci., Gifu Women's Coll., Taromaru, Gifu 501-25, Japan]

Data are given for various characteristics (shell thickness, crushing strength, wt., % yolk, % shell, % total egg contents, % crude fat, % crude protein and % crude ash in the egg contents) of eggs of ducks (Khaki Campbell, Naki and Pekin breeds), Muscovy ducks, hens (Rhode Island Red and Totenko breeds), golden pheasants and silver pheasants. Differences between results for the various species and var. are discussed together with effects of egg wt. on other egg characteristics. [From En summ.] AJDW

## 145

[Egg storage.]

Hayashibara Biochem

*Japanese Examined Patent 5 545 166 (1980) [Ja]*

The storage life of eggs is increased by coating the shells with a mixture containing pullulan or a pullulan derivative. IFT

## 146

Distribution and depletion of radioactivity in hens treated dermally with <sup>14</sup>C-labelled permethrin.

Hunt, L. M.; Gilbert, B. N.; Lemeilleur, C. A.

*Poultry Science* 58 (5) 1197–1201 (1979) [5 ref. En] [US Livestock Insects Lab., Sci. & Education Admin., USDA, Kerrville, Texas 78028, USA]

30 healthy young White Leghorn laying hens (28 wk of age) were treated with <sup>14</sup>C-labelled permethrin (a 25% cis/75% trans preparation) as a mist sprayed at 2 doses (3.77 or 11.94 mg/hen). Permethrin residues were determined in tissues and in eggs laid ≤ 8 wk after treatment. Tables of results are given. Residue concn. were higher for the higher permethrin dose. Max. residue concn. in tissues were observed 3 days after treatment. Skin had the highest permethrin residue concn. (max. 6.690 p.p.m.), followed by kidney (max. 0.718 p.p.m.), liver (max. 0.178 p.p.m.) and fat (max. 0.110 p.p.m.). Residues persisted longest in liver and fat. Permethrin residue concn. in muscle were low (max. 0.046 p.p.m.) and did not persist for > 4 wk after treatment. Max. residue concn. in egg yolk was 0.049 p.p.m.; max. residue concn. in albumen was 0.021. No residues were detectable in eggs 49 days after treatment. AJDW

## 147

[Egg-based additive.]

Hagiwara, Y.

*Japanese Examined Patent 5 545 176 (1980) [Ja]*

The nutrient value of foods and beverages is improved by the addition of a product obtained by the decomposition of poultry eggs. IFT

## 148

[Natural content of cadmium in foods.]

Zimakov, I. E.

*Voprosy Pitaniya* No. 2, 57–61 (1980) [17 ref. Ru, en]

[Vses. Nauchno-issled. Inst. Vet. Sanitarii. USSR]

The natural Cd content of foods was determined by the multiple isotope dilution method using a radioisotope without a carrier [see FSTA (1978) 10 11A666]. Average Cd contents were comparatively low, ranges being (mg/kg) 0.009–0.023 in various meats, 0.012–0.035 in fish, 0.010–0.017 in cereals, and 0.013–0.054 in vegetables [all results lower than the max. permissible levels defined by WHO]. These results were compared with published results obtained using AAS

methods (data tabulated); Cd contents by AAS were  $0.034 \pm 0.031$  in butter and  $0.028 \pm 0.015$  in eggs. Significance of the results with reference to total Cd intake is discussed. RAW

## 149

[Effect of zootechnical management on the quality of high-grade foods of animal origin: feeding.] Die Bedeutung zootechnischer Massnahmen für die Qualität hochwertiger Lebensmittel tierischen Ursprungs: Fütterung.

Günther, K. D.

*Archiv für Lebensmittelhygiene* 31 (5) 162–169 (1980) [7 ref. De, en] [Inst. für Tierernährung, Oskar-Kellner-Weg 6, 3400 Göttingen, Federal Republic of Germany]

The effects of feeding on nutritive value, technological properties and market value of animal carcasses or products (milk, eggs) are reviewed. Data are provided in graphical and tabular form on the effects on the quality (composition) and characteristics of carcasses and various cuts and on the protein content of milk. RM

## 150

The contribution of second quality to egg grading returns.

Lewis, P. D.; Hartland, J. R.

*World's Poultry Science Journal* 36 (4) 208–218 (1980) [2 ref. En, fr, de, ru] [Tetra Poultry Ltd., Andover, UK]

Measurements of 30 140 eggs clearly indicated the average wt. of the second quality removed at the packing station was significantly higher than that of the first quality. Subsequent grading of these seconds did not support the assumption that each grade contributed proportionately to the number of second quality eggs. In fact in most cases EEC size 1 made a much bigger contribution to the % of seconds than any of the other sizes. The mean wt. of a further 638 eggs removed as seconds on the farm in two of the samples were even higher than those of the seconds removed at the packing station. The degree of on-farm grading could therefore influence the differential between first and second quality eggs. The pattern of distribution was

sufficiently consistent to permit the formulation of a simple rule to amend packing station returns when comparing actual gradings with breeder specifications. Observations suggested that some selection for size prior to transporting eggs from farm to packing station, by the removal of obvious over and undersized eggs, could reduce the % of eggs downgraded at the packing station. Comparison of mean wt. estimates with actual mean suggested the use of estimation tables may be more reliable, and certainly more convenient, than sample weighing on farms. AS

## 151

[The effect of phthalate administration to laying hens on the shell thickness, shell weight, egg weight and shell index.]

Ishida, M.; Suyama, K.; Adachi, S.

*Japanese Journal of Zootechnical Science [Nihon Chikusan Gakkai-ho]* 51 (11) 749-753 (1980) [17 ref. Ja, en] [Dep. of Anim. Sci., Fac. of Agric., Tohoku Univ., Sendai-Shi 980, Japan]

Effects of administration of diethylhexylphthalate (DEHP) to laying hens on egg shell quality were evaluated; Babcock hens received (i) a daily dose of 1 g DEHP/kg body wt. by oral intubation, and groups of (ii) Iwaya and (iii) Babcock hens received feed containing 0.5-1.0 g DEHP/100 g feed. Data are presented for egg production, egg wt., shell thickness, shell index, production of soft-shelled eggs, and serum Ca concn. In group (ii), DEHP administration significantly reduced egg wt., shell wt., shell thickness and shell index for the first 16 wk of treatment, but not subsequently. DEHP significantly increased the incidence of soft-shelled eggs in groups (i) and (iii), and decreased serum Ca levels in group (iii). [From En summ.] AJDW

## 152

[Relationships between egg weight and proportions of egg yolk and egg white and some egg characteristics.]

Csuka, J.; Ledec, M.

*Pol'nohospodarstvo* 26 (3) 286-294 (1980) [16 ref. Sk, en, ru] [Vyskumny Ustav Chovu & Slachteria Hydiny, 900 28 Ivanka pri Dunaji, Czechoslovakia]

60 eggs each were collected during the 4th month of lay from 8 populations of laying hens (Dominant, Start 1, Jantar 03, Tetra 03, Sex-Sall-Link F, 59X, GH-041, and 506B) kept under the same conditions on the RVHP international control and examination station in Zalesi (Slovakia) in 1973-1974. Egg wt. and proportions of egg yolk and egg white were determined as well as egg vol., DM contents of thin, thick and total egg white, thin, thick and total egg white vol., egg yolk vol., egg yolk refraction, and egg yolk index. Mean values with s.d. and other statistics are tabulated for all variables measured in eggs of each of the 8 populations; and correlation coeff. (and their significance) between egg wt. and yolk and white proportions and the other characteristics are tabulated for each population. The relationships are discussed in detail. SKK

## 153

Responses of laying hens to gradual and abrupt increases in ambient temperature and humidity.

Daniel, M.; Balnave, D.

*Australian Journal of Experimental Agriculture and Animal Husbandry* 21 (109) 189-195 (1981) [27 ref. En] [Dep. of Anim. Husbandry, Univ. of Sydney, Werombi Road, Camden, NSW 2570, Australia]

White Leghorn x Australorp laying hens were gradually or abruptly exposed to summer climate regimens in which high RH and temp. ( $> 35^\circ$ ) were simulated. Heat stress affected egg shell strength only in 1 experiment, and even here control and heat-stressed hens gave similar shell strength; Haugh unit index of eggs was unaffected by heat stress. Thus egg quality did not deteriorate significantly at high temp., possibly due to a high atmospheric concn. of CO<sub>2</sub> produced by excessive panting. This crossbreed is therefore considered suitable for use in the Australian climate. LH

## 154

[Enquiry into the factors which influence egg consumption.]

Berger, J. F.; Surville, J. M.; Boggio, V.; Klepping, J. *Cahiers de Nutrition et de Dietétique* 15 (4) 249-260 (1980) [5 ref. Fr, en] [Lab. de Physiol., ENSBANA, Campus Universitaire, 7 Boulevard Jeanne d'Arc, 21033 Dijon Cedex, France]

Per capita consumption (1975) of eggs in France was 225 eggs/yr, vs. 240 in the EEC, 410 in Israel and very low in developing countries. In view of the high nutritional value of eggs in relation to their price (resembling milk) a survey by questionnaire was conducted to identify possible reasons for the relatively low consumption in France. The enquiry involved personal interviews of 526 individuals in Dijon (details given of sex, age groups, occupation, level of education, family composition); replies to a long series of questions are classified and analysed. Egg consumption/wk was classified as: none, 0.4% of individuals; 2 or less 24.9%; 3-4 59%; and 5 or more 15.7%. Among 'prestige' foods 1st choice was recorded (%) as meat 76.2, eggs 13.3, poultry 5.7, pork 2.7, fish 2.1. Egg consumption was slightly higher among men, the highest consumption group being men aged <25 yr and the lowest old people over 65 yr. At all ages meat was the 1st choice and eggs the 2nd. At ages below 65, omelettes were the preferred method of preparation, but older people preferred boiled eggs. Factors which motivated choice of eggs were the 'freshness' idea 96%, easy preparation 35.6% (especially young unmarried men), taste liked 24.9%, good for health 21.1% and (among women) low price 10% and easy preservation 9.1%. Young women revealed greatest awareness of nutritional value. Factors stated to discourage consumption (mainly ill-informed health fears and older age groups) were digestive problems 22.5%, high cholesterol 12%, dislike of 'modern' methods 13.4% plus lack of freshness 25.7%. Quality factors given in order of importance were freshness 96%, traditional origin 65.6%, no inclusions 60.9%, yolk colour 50.1%, with price (19.8%) and packaging (12.2%) less important. ELC

## 155

Residual DDT in two successive generations of quail and their eggs.

David, D.

*Poultry Science* 59 (6) 1183-1186 (1980) [20 ref. En]  
[Lab. de Biol. Anim., Univ. de Clermont-Ferrand,  
CNR SERA 408, BP No. 45, F-63170 Aubiere, France]

Quail (*Coturnix coturnix japonica*) eggs were immersed for 30 s in a 0.5% aqueous solution of commercial DDT before incubation. DDT, DDD and DDE were determined by GLC in quails (generation 1), hatched from these eggs, in second and third generation eggs laid by these quails, and in tissues of quails hatched from the second generation eggs. The results show that the DDT-treated eggs and 1st-generation quails hatched therefrom had levels of DDT and its metabolites significantly higher than those of control eggs and birds. The concn. of DDT and its metabolites in 2nd-generation eggs laid by these quails at the beginning of the laying period (and chicks hatched from such eggs) were higher than those in control eggs or chicks; however, 2nd generation eggs laid 3 months later (and the chicks hatched therefrom) had DDT and DDT metabolite concn. little different from control samples. DDT and metabolite concn. in 3rd generation eggs did not differ significantly from those in control samples. Pesticide residues were retained preferentially in liver and feathers; muscle tissue had only low pesticide concn. Metabolism of P,P'-DDT to P,P'-DDE was observed. AJDW

## 156

External and internal quality and chemical composition of hen eggs as related to hen age and selection for production traits.

Ambrosen, T.; Rotenberg, S.

*Acta Agriculturae Scandinavica* 31 (2) 139-152 (1981)  
[29 ref. En] [Dep. of Poultry & Rabbits, Nat. Inst. of  
Anim. Sci., 1958 Copenhagen V, Denmark]

A control line (no artificial selection, C), and 2 experimental lines selected for high egg wt. (E) and large eggs (N) until the age of 42 wk, were set up to study egg quality as related to hen age and selection. Eggs were collected from hens of 26, 31, 35, 43, 48, 52 and 61 wk old, stored at 15-20°C, boiled for 20 min, weighed, broken and yolk and white were analysed. Solids in yolk (average value) were 52.18%, 52.50% and 52.42% in C, N and E; correspondingly protein % in yolk was 16.58, 16.20 and 16.56; total lipid in yolk (g/100 g) was 31.89, 31.68 and 31.51; phospholipid in yolk (g/100 g) was 11.11, 11.02, and 10.80; cholesterol in yolk (mg/100 g) was 1306, 1226 and 1298; solids in albumen (%) were 13.27, 12.86 and 13.25; protein % in albumen was 10.76, 10.42 and 10.70; protein % in solids of albumen was 81.08, 81.05 and 80.74. An extensive study of eggs from 180 hens of each line, for solids and protein in the albumen, was also conducted. % protein in yolk increased with age of hens in C, N and E lines, as did concn. of solid in yolk, whereas total lipid concn., concn. of yolk cholesterol, and concn. of protein and solid in albumen decreased. Several phenotypic correlations between different production traits and/or chemical components were shown, and significant differences between the 3 lines exist for some of these correlations. LH

## 157

Complete processlines for egg-powder production.

Nielsen, B.

*Nordeuropaeisk Mejeri-Tidsskrift* 47 (2) 45-50 (1981)  
[En, da, de] [Anhydro A/S, Copenhagen, Denmark]

Production of egg powder (to avoid surplus and wastage of fresh eggs) from the 10% of fresh eggs which do not meet top quality standards is discussed under headings of: range of products (spray dried yolk, white and whole egg, frozen or liquid yolk, white and whole egg, and crystal egg white), mode of operation (flow diagram provided), candling, washing, egg breaking, filtration, pre-handling, pasteurization, freezing, production of crystal white, spray drying, and packing and storage. A table of egg composition is given and shows egg white to contain 13% DM, 87% water, 11% protein, 0.03% lipid, 0.4% ash, 0.8% glucose; yolk contains correspondingly 51%, 49%, 17%, 32%, 0.2% and 1.5%; and whole egg 25%, 45%, 13%, 11%, 0.3% and 1%. LH

## 158

[Rheological properties of bulk eggs.]

Polyakova, G. A.; Gavrilin, A. V.; Bulgakov, N. L;  
Kosmodem'yanskii, Yu. V.

*Myasnaya Industriya SSSR* No. 11, 32-34 (1979) [Ru]  
[VNII Biotekh., USSR]

Data for viscosity of bulk liquid egg are essential for planning of evaporation and drying equipment, and for development of thermal processing regimes. The rheology of the liquid egg was studied over the shear gradient range 1.5-1300 s<sup>-1</sup>, at 20-60°C. Results, given as a series of graphs and mathematical formulae, showed that a considerable increase in the shear rate caused a drop in the effective viscosity of the bulk egg. The effect of DM content on the results is also discussed. STI

## 159

Rheological studies of high ratio cake batters to investigate the mechanism of improvement of flours by chlorination or heat treatment.

Guy, R. C. E.; Pithawala, H. R.

*Journal of Food Technology* 16 (2) 153-166 (1981)  
[28 ref. En] [J. Lyons Cent. Lab., 149 Hammersmith  
Road, London W14 8QT, UK]

The rheological changes taking place in cake batters between 70 and 90°C were studied using chlorinated, heat-treated (120°C for 7 min) and untreated flours. In an aqueous sucrose solution of equivalent concn. to that found in cake batters, untreated flour formed a weaker gel system than treated flours. This difference was probably due to the slower and less extensive swelling of the starch granules. Egg proteins contributed significantly to the overall gel strength of the cake matrix. Effect of egg proteins was significantly greater with treated flours than with untreated flours. AS

**160**

[New ways for the utilization of whey proteins. II. Foaming products for replacing eggs.]  
Paquet, D.

*Technique Laitiere* No. 952, 69-71 (1981) [19 ref. Fr]  
[Lab. de Biochem. Appliquée, Univ. de Nancy 1 - 54037 Nancy, France]

The author reviews studies concerned with the processes for producing foaming whey products, including those involving ultrafiltration and chromatography for obtaining whey protein concentrates, and the effects of various process parameters on the stability of the foam. [See preceding abstr. for part I.] FL

**161**

Selenium content of Norwegian milk, eggs and meat.  
Karlsen, J. T.; Norheim, G.; Froslie, A.

*Acta Agriculturae Scandinavica* 31 (2) 165-170 (1981)  
[30 ref. En] [Nat. Vet. Inst., Oslo, Norway]

Se content was determined in samples of Norwegian cows milk, hens eggs and various meats. Results are quoted as µg/g. Pooled fresh milk samples gave Se levels of 0.008-0.014 (mean 0.011) and eggs were 0.21-0.32 (0.25). In animals from the southeastern areas values were: cattle meat 0.01-0.09 (0.036); sheep meat 0.01-0.16 (0.83); pig meat 0.05-0.16 (0.092); chicken meat 0.17-0.28 (0.22); and turkey meat 0.15-0.21 (0.18). Values for Se levels in meat of other countries were also determined. Thus eggs and poultry meats are good sources of Se, and cows milk and ruminants meat are poor sources, with pork as an intermediate source. LH

**162**

Determination of phosphorus-32 and calcium-45 in biological samples by Cerenkov and liquid scintillation counting.

Bem, E. M.; Bem, H.; Reimschüssel, W.

*International Journal of Applied Radiation and Isotopes* 31 (6) 371-374 (1980) [12 ref. En] [Tech. Univ. of Lodz, Lodz, Poland]

A practical procedure is described for the estimation of  $^{32}\text{P}$  and  $^{45}\text{Ca}$  in various biological samples, using wet ashing with 70%  $\text{HClO}_4$  and 30%  $\text{H}_2\text{O}_2$ . Cerenkov and liquid scintillation counting. Tabulated results show recoveries of 98% for  $^{32}\text{P}$  and 95% for  $^{45}\text{Ca}$  in rats' milk, 99 and 94% resp. in egg shell, 98 and 104% in egg white, and 99 and 95% in egg yolk. RM

**163**

Carotenoids in fruits and flowers.

Premachandra, B. R.; VasanthaRajan, V. N.; Cama, H. R.  
*World Review of Nutrition and Dietetics* 31, 154-158  
(1978) [11 ref. En] [Dep. of Biochem., Indian Inst. of Sci., Bangalore 560 012, India]

GulMohr (*Delonix regia*) flower petals, which are known to be very rich in β-carotene were dried and the powder obtained was added to poultry feed at levels of 1, 5 and 10% (by wt.). The supplemented feed was fed to laying hens for 8 wk. Examination of the egg yolks indicated that dietary levels of 5 and 10% GulMohr petal powder resulted in a significant improvement in yolk colour and increased contents of β-carotene,

xanthophyll and vitamin A. It is recommended that supplementation of poultry feed with costly synthetic vitamin A be replaced by supplementation with 5% GulMohr petal powder. Further studies examined the possibility of increasing the β-carotene content of tomato var. grown in India; such an increase would be of considerable value in this country where vitamin A deficiency is widely prevalent. Tomato mutants (from the UK, USA and Poland) having high β-carotene contents but a poor colour (due to their low lycopene and total carotene contents) were crossed with the Indian var. Pusa Ruby which has a good colour but a low β-carotene content, the aim being to produce hybrids with an acceptable colour and reasonable β-carotene content. Studies of the  $F_1$  and  $F_2$  generations indicated that some of the crosses had such characteristics. JA

**164**

Intermittent illumination of laying hens and its effect on laying performance, egg quality, and patterns of laying and feed intake.]

Torges, H.-G.; Rauch, H.-W.; Wegner, R.-M.

*Archiv für Geflügelkunde* 45 (2) 76-82 (1980) [10 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Celle, Dörnbergstrasse 25-27, 3100 Celle, Federal Republic of Germany]

Groups of Lohmann Selected Leghorn laying hens were used in a series of studies on effects of lighting conditions on laying performance and egg quality. 4 light regimes were used: (i) 16 h light/8 h dark; (ii) 14 h light, 4 h dark, 2 h light, 4 h dark; (iii) 8 h light, 4 h dark, 8 h light, 4 h dark; and (iv) 4 h light, 2 h dark cycle repeated 4 times in each 24 h period. Tables of data are given for egg wt, shell wt, shell %, breaking strength, shell deformation value, albumen height, yolk height and yolk colour score. The results show that (iii) and (iv) gave significantly fewer eggs but higher egg wt and better shell quality than (i); results for (ii) did not differ significantly from those for (i). No significant effect of lighting regime on any of the interior quality characteristics was observed. AJDW

**165**

Control eggshell packaging damage.

Tolman, W. J.

*Poultry International* 19 (11) 16, 18, 20, 24, 28, 102, 107 (1980) [En, de, fr, es, it, ja, ar]

Control of damage to egg shells during packaging of eggs is discussed, with reference to: the relatively low level of damage in retail sales premises; the considerable variation in levels of egg damage; the importance of efficient cleaning and maintenance of egg packaging equipment; modification of equipment to eliminate sources of breakage; training of employees; and testing of egg packaging lines to determine where damage is occurring. AJDW

**166**

[Effect of the enzyme preparation Promase on the laying performance of hens and the hatching performance of eggs.]

Korniewicz, A.; Gwara, T.; Mazanowska, A.; Kaczmarek, K.

*Roczniki Naukowe Zootechniki, Monografie i Rozprawy* No. 18, 257-270 (1980) [24 ref. Pl, en, ru, de] [Inst. Zootech. Zaklad Doswiadcza Czescznica, 55-011 Siechnice, Poland]

208 New Hampshire hens were used in a 137-day feeding trial conducted to evaluate effects of diets with or without the enzyme preparation Promase on laying performance and egg quality. Diets tested contained: (i) 20.59% total protein (4.73% protein of animal origin); (ii) 18.54% total protein (2.28% of animal origin) + 0.05% Promase; (iii) 16.71% total protein (no animal protein) + 0.05% Promase; and (iv) 16.71% total protein, with no animal protein or Promase. Data are included for egg wt., yolk, albumen and shell wt. and %, DM and protein contents of the albumen, DM, protein, fat, and vitamin A content of the yolk, and Ca, P and Mg contents of the shell. Significant diet-related differences were observed only for shell wt. (higher for (iii) and (iv) than for (i) and (ii)), and vitamin A concn. in the yolk (higher for (i) than for (ii)-(iv)). AJDW

**167**

Evaluation of 2-way and 3-way White Leghorn strain crosses for production and egg-quality traits.

Reddy, V. D.; Mohapatra, S. C.; Ayyagari, V.; Choudhuri, D.; Thiagasundaram, T. S.; Shyamsunder, G. *Indian Journal of Animal Sciences* 50 (12) 1104-1109 (1980) [13 ref. En] [Indian Vet. Res. Inst., Izatnagar, Uttar Pradesh 243 122, India]

Studies were conducted to evaluate laying performance and egg quality characteristics of 12 2-way and 8 3-way crosses of 4 White Leghorn strains, L33, L55 and L99. Trials were conducted up to 40 wk of age. Tables of data (means and s.e.) are given for various laying characteristics and for albumen height, albumen index, yolk index and shell thickness. Performance of 3-way crosses is compared with that of 2-way crosses. The 3-way crosses had significantly greater albumen heights, higher yolk indices and thicker egg shells than the 2-way crosses. Albumen indices did not differ significantly between 2- and 3-breed crosses. AJDW

**168**

Egg transfer bar.

Niederer, L. H.; Niederer, T. O. (Otto Niederer Sons Inc.)

*United States Patent* 4 258 839 (1981) [En]

Egg transfer bars are described for use in groups arranged in parallel extending rows as egg carrying conveyors, each bar including a main shaft that has a number of egg receiving locations. AS

**169**

[Containerized delivery of eggs to the retail network.]

Rudavskaya, A. B.; Shkarupa, V. F.

*Tovarovedenie* No. 13, 28-31 (1980) [Ru]

A general discussion is presented on containerized movement of eggs as compared with traditional transportation. The containers are packed with 12 boxes (each containing 360 eggs) directly on the poultry farm. Advantages given for the new system include reduced egg processing time (no pre-cooling necessary), reduced time from loading the vehicles to unloading at point of destination, and reduced costs and manpower requirements. RAW

**170**

Non-destructive techniques to determine egg quality.

Griffith, D. L.

*Dissertation Abstracts International*, B 41 (6) 2107: Order no. 8029121, 213pp. (1980) [En] [Univ. of Georgia, Athens, Georgia 30601, USA]

Apparatus was designed and constructed to monitor accurately the rolling behaviour of shell eggs. Effects of decreases in internal viscosity occurring during egg ageing on rolling behaviour were studied. A significant positive correlation was found between rolling behaviour and internal quality for these eggs stored for up to 9-10 days, representing min. Haugh unit scores of approx. 54-57. After eggs had declined to Haugh unit

scores of approx. 42-45 no definite relationship was evident. Egg wt., length and diam. were indicated as affecting the relationship between rolling behaviour and internal quality. Relationships between dynamic parameters and various internal and external egg parameters were investigated using direct stress-strain dynamic testing. Linear relationships were evident between the magnitude of the 3 dynamic parameters (absolute value of complex modulus, phase angle and shell deformation at constant force) and the frequency at which the tests were conducted. The stress relaxation and creep behaviour of shell eggs were investigated and rheological models proposed to describe this behaviour. Results indicated that the stronger the shell the less its ability to alleviate initially applied stresses and the smaller the amount of creep experienced by the shell at infinite time. SP

**171**

Evaluation of brewer's dried grains in the diets of laying hens.

Deltoro Lopez, J.; Fernandez Carmona, J.; Martinez Pascual, J. L.

*Animal Feed Science and Technology* 6 (2) 169-178 (1981) [29 ref. En] [ETSI Agron., Univ. Politecnica, Valencia, Spain]

20 Rhode Island Red hens (in the 7th month of lay) were used in a study on effects of diets containing 0, 15, 30, 45, 60 or 90% brewers dried grains (BDG) on laying performance and egg quality. A table of results is given, including data for egg wt., Haugh unit score, % yolk, % albumen, % shell, yolk index, and density and thickness of the shell. Shell wt., % and thickness tended to decrease with increasing level of BDG in the diet.

Haugh unit score was significantly lower for hens fed diets with 0 or 90% BDG than for those fed intermediate BDG levels. The remaining egg characteristics were not significantly influenced by the variables studied. AJDW

## 172

**Study of an enzymatic method for determination of cholesterol content in egg.** [Lecture]

Shen, C.-S. J.; Chen, I. S.; Sheppard, A. J.

**Federation Proceedings** 40 (3, II) 878 (1981) [En] [Div. of Nutr., Bureau of Foods, FDA, Washington, DC 20204, USA]

Feasibility of using the enzyme cholesterol oxidase for quantitative detn. of cholesterol content in egg was studied. Cholesterol in the egg was extracted along with other lipid components by methylene dichloride/methanol (2:1, v/v) mixture. Enzymic detn. of cholesterol was carried out following extract saponification. The assay mixture contains the following components: phosphate (0.51 mol/l),  $\text{NH}_4^+$  (0.88 mol/l), methanol (1.43 mol/l), acetylacetone (18.8 mmol/l), sodium dodecylsulphate (32.0 mmol/l), catalase (approx.  $1.3 \times 10^6$  U/l), and cholesterol oxidase (approx. 120 U/l) in a final vol. of 2.52 ml at pH 7.0. When the incubation temp. is 41°C, 90 min is required to complete the reaction, prior to reading at 405 nm. The reaction was linear for cholesterol up to 185 µg. It was found that the cholesterol content of egg, as determined by the enzymic method, is comparable to that obtained by GLC. [See FSTA (1981) 13 12A755.] AS

## 173

[Dry matter content of eggs of hens tested on the International Poultry Control and Testing Station in Zalesi.]

Csuka, J.; Ledec, M.; Zatko, T.

**Zivocisna Vyroba** 26 (1) 69-77 (1981) [10 ref. Sk, ru, en, de] [Vyskumny Ustav Chovy & Sl'achteria Hydiny, 900 28 Ivanka pri Dunaji, Czechoslovakia]

During 1973 and 1974, batches of 60 eggs were obtained on the Zalesi (Czechoslovakia) testing station from 8 groups of hens in the 4th month of lay. The hybrid lines tested were: (i) Dominant (Czechoslovakia), (ii) Start 1, (iii) Yantar' 03, (iv) Tetra 03 (all 3 from USSR), (v) Sex-Sal Link F (Hungary), (vi) 59 x (German Democratic Republic), (vii) GH-041 (Poland), and (viii) 506B (Bulgaria). Mean values with s.d. tabulated for (i)-(viii) for 9 egg characteristics and correlation coeff. between them include the following ranges: thin albumen DM (%)  $10.95 \pm 7.47$  (vii) to  $11.85 \pm 6.00$  (i); total albumen DM (%),  $10.86 \pm 6.68$  (vii) to  $11.74 \pm 4.40$  (i); refractive index of yolk,  $1.4149 \pm 0.00034$  (ii) to  $1.41170 \pm 0.000264$  (i). The correlation coeff. between thin albumen DM and total albumen DM ranged from 0.757 (i) to 0.967 (vii). SKK

## 174

**Synthesis and assessment of three compounds suspected as egg aroma volatiles.**

Gil, V.; MacLeod, A. J.

**Journal of Agricultural and Food Chemistry** 29 (3) 484-488 (1981) [22 ref. En] [Dep. of Chem., Queen Elizabeth Coll., London Univ., London W8 7AH, UK]

Previous work provided evidence of the occurrence of 3 novel compounds in the aroma volatiles of hen's egg, namely, 1,2,4-trithiolane, 2-butylinan, and O-decylhydroxylamine. Here the synthesis of these 3 compounds is reported, but only the first 2 were confirmed as genuine components of egg volatiles. This is the first report of 1,2,4-trithiolane as a food volatile. AS

# EGG PRODUCTS

## 1

[**Laboratory experiments on possibilities of granulation or instantization of dried egg constituents with different types of apparatus.**] Lacova, V.; Jarossova, M.

*Hydinarsky Priemysel* 21 (11/12) 424-433 (1979) [11 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

The experiments were carried out with 3 different types of apparatus used for fluid granulation of powder products in the pharmaceutical industry and for production of instant dried skim milk. However, it was observed that behaviour of egg contents during the process differed so much from that of normally dried products that none of the equipment tested gave reasonable results. It was concluded that the problem could not be solved without previous detailed study of physico-mechanical, hydrothermal and other physical properties of eggs during drying. STI

## 2

[**Efficiency of refrigerating bulk egg in the URMA rotor unit.**] Kuznetsova, T. E.; Karikh, T. M.; Sivacheva, A. M.; Tsvetkov, A. I.

*Kholodil'naya Tekhnika* No. 11, 31-34 (1979) [7 ref. Ru]

Industrial testing of the URMA plate rotor freezing unit shows that it can produce frozen bulk egg in up to 6 kg blocks wrapped in 0.08 mm polyethylene film; freezing time is 3-4 h. Freezing cost reduction was studied; the parameters of the product can be selected for optimum block thickness and freezing environment temp. STI

## 3

**Cholesterol-free egg product having improved cooking tolerance.**

Seeley, R. D.; Seeley, R. B. (S. & R. Food Co. Inc.)

*United States Patent* 4 200 663 (1980) [En]

An essentially cholesterol-free egg product, capable of being cooked in a steam-jacketed vessel into scrambled egg, consists essentially of 84-88% (by wt.) liquid egg whites, 3% egg white solids, 2% dried skim milk, 1% carboxymethyl cellulose (CMC), 0.1-0.3% mono- and diglycerides, 0-4% vegetable oil, 0.05-0.15% organic acid, 0.15-0.50% carrageenan and approx. 5% water. It is made from a dry blend containing 47% dried egg whites, 28.1-33.5% dried skim-milk, 14.6% CMC, 1.5% citric acid and 2.5-7.5% carrageenan. EJM

## 4

[**Use of ammonium glycyrrhizate as foaming agent during manufacture of souffle-type sweets.**] Badanov, Sh. Sh.; Antokolskaya, M. I.

*Khlebopekarnaya i Konditerskaya Promyshlennost'* No. 1, 35-36 (1980) [Ru] [Vses. Nauchno-issled. Inst. Konditerskoi Promyshlennosti, USSR]

Glycyrrhizate, the ammonium salt of glycyrrhizic acid, possesses a higher foam forming capacity than the acid. A method for detn. of foaming capacity and stability of foams was devised and the procedure and apparatus used are described. The glycyrrhizate foam weighed 160 kg/m<sup>3</sup> and no water separated after 2 h. Foam produced from egg whites under equal conditions weighed 330 kg/m<sup>3</sup> and 3.2% of water separated. When egg whites with glycyrrhizate were used in the ratio of 1:1 the glycyrrhizate flavour was completely eliminated and the product maintained its physical properties. STI

## 5

[**Improved meringue.**] Meili, R. (Firma Schoxi AG)

*United States Patent* 4 210 679 (1980) [En]

A process is described for the manufacture of a xylitol-containing meringue which retains its stiffness for a prolonged period of time after whipping. IFT

## 6

[**Method and equipment for producing foods containing coagulated proteinaceous substances.**] Rismann, D. O.; Bengtsson, N.

*Swedish Patent Application* 411 162 (1979) [Sv]

A heat-coagulable product, e.g. prepared meat, fish, eggs or the like, is formed into a strand, and passed through a tube permeable to microwaves. The strand is irradiated with microwaves in  $\geq 1 \text{ TM}_{02}$  applicator (which gives the highest heat intensity in the centre of a cross-section through the strand and the lowest intensity at the periphery of the cross-section). The product is then discharged and the strand is conveyed in solid form. W&Co

## 7

**Bacteriological changes during the manufacture of noodles.** (In 'Food microbiology and technology' [see FSTA (1981) 13 3B17]) [Lecture] Tiecco, G.; Corsalini, T.

pp. 141-153 (1979) [20 ref. En, it] [Istituto di Ispezione & Controllo Derrate Alimentari di Origine Anim., Univ. di Bari, Bari, Italy]

Bacteriological controls on frozen egg used for preparing egg noodle and on the product during processing are described. 2 experiments were done, one to examine pasteurized or unpasteurized frozen liquid egg for microbes and the other to examine the product during processing. The bacterial population, especially enterobacteria, increased in thawing the eggs and particularly during their transport by pipe-line to the kneading machine. The population was reduced when eggs were mixed with flour, partly due to the dilution factor and also because of the resultant fall in water activity. Population rose slightly during desiccation. *Salmonella* isolated from unpasteurized frozen egg were *S. saint-paul* and from the finished product were *S. saint-paul* and *S. livingstone*. This shows the need for disinfection of the factory and any equipment used. Use of pasteurized egg is considered essential. Other suggestions for production of hygienically acceptable pasta are provided. LH

8

**[Intensified freezing of bulked eggs.]**

Karikh, T. M.; Kuznetsova, T. E.; Sivacheva, A. M.; Mekenitskii, S. Ya.

*Myasnaya Industriya SSSR* No. 1, 18-19 (1980) [3 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsopererabatyvayushchei i Kleezhelatinovoi Promyshlennosti "Kompleks", USSR]

The URMA universal rotor-type unit is based on the plate rotor unit ARSA-3-15; a major feature is mechanized discharge and subsequent horizontal deposition of the frozen product into the same freezing section, which reduces idle run of the mechanism to a min. The frozen blocks are ejected mechanically from the frames. The URMA unit is most suitable for egg melange owing to perfect functioning of the filling and discharge systems; it has an output of 15 t/day. The melange is pasteurized and chilled and is directed for further processing at 4-6°C in polyethylene bags, made from 0.08 mm thick film, measuring 500 × 290 mm. The net wt. of the melange in the bag is 6 kg. The bags are hot sealed after filling, taken to a fast-freezing unit to be placed into sections on 370 × 240 × 70 frames holding 6 pieces each. The batch weighs 1224 kg; the freezing time with coolant temp. of -30°C is 240 min to reach -6°C product core temp. The frozen blocks fall out automatically from the machine. STI

9

**Survival of faecal streptococci in raw and pasteurised egg products**

Payne, J.; Gooch, J. E. T.

*British Poultry Science* 21 (1) 61-70 (1980) [14 ref. En] [Agric. Res Council, Food Res. Inst., Colney Lane, Norwich NR4 7UA, UK]

The ability of *Streptococcus faecalis* and *Str. faecium* strains to survive in egg albumen and liquid whole egg before and after laboratory pasteurization was studied. Pasteurization of egg albumen caused a decrease in viable cells of less than 10-fold, while pasteurization of whole egg caused decreases of more than 100-fold in only 2 of the 8 strains studied. After growth in whole egg, some strains were more resistant to pasteurization in whole egg. *Str. faecalis* multiplied in raw and pasteurized whole egg but not in egg albumen.

*Str. faecium* multiplied in raw and pasteurized whole egg only after an initial decline in viability which was not shown by cells adapted to whole egg. Together with storage temp., this affected the number of viable cells after a storage period of 5 days. In raw and pasteurized egg albumen, *Str. faecium* strains lost viability; this was max. at 37°C, and more cells survived as the storage temp. decreased. AS

10

**Energy usage for production of omelets in restaurants.**

Unklesbay, N. F.; Unklesbay, K. B.; Benderwald, D. L.; Demmitt, M. E.

*Poultry Science* 59 (5) 1036-1042 (1980) [16 ref. En] [Dep. of Food Sci. & Nutr., Univ. of Missouri, Columbia, Missouri 65211, USA]

Energy usage was determined for production of 3 kinds of omelettes under actual operating conditions in a fast food and a family dining facility. Information was obtained by on-site data collection during normal breakfast service times within each facility during a 2 wk period. An energy accounting model previously developed for various menu items was used. Omelettes prepared in the fast food facility had a significantly longer heat processing time and used greater amounts of food ingredients/omelette and heavier pans. The family dining situation had a significantly greater energy input due to the use of a larger gas burner. Energy losses > 80% were revealed for all products. Energy/nutrient ratios were reported for MJ expended/kcal and /g of protein at point of service. Recommended changes given for improving energy efficiency included controlling the time the gas burners were ignited, altering the configuration of the pan and the burner, using pans with higher thermal conductivity values, and altering food service procedures to maximize energy efficiencies. AS

11

**Specification for egg powder.**

India, Indian Standards Institution

*Irish Standard Specification IS 4723, 16pp. (1978) [En]*

This standard, revised from that of 1968, applies to egg powder made from the liquid contents of sound, wholesome hens' eggs by any recognized method of spray-drying, and covers hygienic and processing requirements. Specifically included are: moisture content, < 2%; protein (N × 6.68), > 45%; lecithin and fat, > 40%; solubility, > 85%; organic P<sub>2</sub>O<sub>5</sub>, > 1.25%; total ash, < 3.6%; ash insoluble in HCl, < 10%; and O<sub>2</sub> content, < 2.0% (all by mass). Total plate count shall be < 75 000/g; yeast and mould count, < 50/g; and coliform count, < 100/g. *Salmonella* and boric acid are specifically prohibited. Packaging (in N<sub>2</sub> or N<sub>2</sub> + CO<sub>2</sub>, tinplate or flexible containers) is also covered. Appendices give details of methods for detn. of moisture content, solubility, lecithin and fat contents, and O<sub>2</sub> content of containers, as well as sampling requirements. KME

12

**Microbiology of meat, fish and poultry.**

Savagaon, K. A.

*Indian Food Packer* 32 (5) 50-57 (1978) [En] [Britannia Sea Foods, Bombay, India]

Aspects covered include: fresh meat, spoilage of fresh meat and control of spoilage; cooked and cured meat products; cured meats; poultry and eggs - spoilage types; control of spoilage of shell eggs; liquid egg products; fresh fish spoilage; nature of spoilage and preventive measures; cured fish; and pathogenic bacteria in fish, meat and poultry. CFTRI

13

**Method for making scrambled egg.**

Schindler, J.; Nugarus, A. R.

*United States Patent* 4 228 193 (1980) [En]

In a method for cooking scrambled eggs in a containerized batch, jets of steam are employed to agitate and cook the composition. RAW

## 14

[Evaluation of krill for feeding breeding chickens and hen reproductive stock.]

Uzieblo, L.; Danczak, A.; Tarasewicz, Z.; Zaprzaluk, I.; Niemesz, L.

*Roczniki Naukowe Zootechniki* 7 (1) 245-254 (1980) [9 ref. Pl. en, ru] [Inst. Hodowli i Tech. Produkcijs Zwierzej Akad. Rolniczej, Szczecin, Poland]

This paper includes data for quality characteristics of eggs laid by hens fed diets without krill meal, or with 3, 6 or 9% pink or beige krill meal. Yolk colour intensity increased with increasing krill meal concn. in the diet, the increase being greater with pink krill meal than with equivalent quantities of beige krill meal. Added krill meal impaired the aroma and overall palatability of omelettes and cakes made with the eggs studied; adverse effects of beige krill meal were greater than those of pink krill meal. AJDW

## 15

Replacement of whole egg in baked custard.

Corbett, C. R. (Stauffer Chemical Co.)

*United States Patent* 4 214 010 (1980) [En]

The whole egg replacement mixture consists of 40-60% of a blend of a whey solids product with 0.5-5.0% carboxymethylcellulose and 60-40% of a lactylated shortening. The whey solids component comprises 74-100% of a substantially non heat-denatured whey protein concentrate (containing at least 35% protein at least 50% of which was prepared from acid whey) and 0-25% of another protein-containing whey based product. The composition could be used to replace up to 75% of the whole egg requirement of baked custard. EJM

## 16

Apparatus for making scrambled eggs.

Schindler, J.; Nugarus, A. R. (Restaurant Technology Inc.)

*United States Patent* 4 233 891 (1980) [En]

Method and apparatus are described for cooking scrambled eggs. Container for holding uncooked, shelled eggs is sealed with a cover around a projecting cylindrical, multi-orificed, steam injection conduit. Jets of steam and air are injected to agitate and cook the eggs and a disc-like baffle plate prevents upward spattering of the eggs during steam injection; a vent passage maintains interior vol. of the container at approx. atmospheric pressure. AS

## 17

Omelets from pasteurised frozen whole egg by use of fresh, freeze-dried or spray-dried egg white.

Sauter, E. A.; Petersen, C. F.

*Poultry Science* 59 (2) 293-297 (1980) [12 ref. En]

[Anim. Sci. Dep., Univ. of Idaho, Moscow, Idaho 83843, USA]

Pasteurized frozen whole egg (PWE) was evaluated for use as the principal ingredient of omelettes. 3 types of omelettes were used in the evaluation: plain, utilizing beaten whole egg; puffy, normally prepared with yolks and whites whipped separately; and 10-min omelettes

prepared similarly to puffy omelettes except that 40 g flour was added. Sensory evaluation compared omelettes made from PWE and reference omelettes made from fresh eggs for acceptability, colour, flavour, moistness, and tenderness. Scoring was from 0 to 6 with reference equal to 4.0. Colour of plain omelettes made from PWE was significantly darker than that of the reference omelettes. Acceptability and other sensory factors of puffy and 10-min omelettes made from PWE were not significantly different from those of comparable reference omelettes when 17.3% of the pasteurized or fresh whole egg was replaced with fresh egg white or reconstituted freeze-dried egg white for leavening. Reconstituted spray-dried egg white required substitution of 23.1% of the PWE to produce puffy or 10-min omelettes which were equal to reference omelettes. AS

## 18

Decholesterolized and defatted egg powder and method for producing same.

Yano, N.; Fukinbara, I.; Yoshida, K.; Wakayama, Y. (Asahi Kasei Kogyo KK)

*United States Patent* 4 234 619 (1980) [En]

Decholesterolized and defatted egg powder is obtained by removing  $\geq 95\%$  of the cholesterol and neutral fat and retaining  $\geq 30\%$  of the phospholipids, based on their content in the whole egg or yolk. The powder is obtained by removing moisture from whole egg or yolk and extracting cholesterol and neutral fat from the dried whole egg or yolk with liquid dimethyl ether. AS

## 19

[Evolution and present situation of Italian legislation on pasta products.]

Spada di Nauta, V.

*Tecnica Molitoria* 31 (10) 755-761 (1980) [34 ref. It.]

[Istituto di Merceologia, Univ. di Bari, Bari, Italy]

Historical aspects of legislation for pasta products in Italy are discussed, and laws currently in force are discussed with reference to: requirements concerning use of soft wheat products; definition of pasta products; specified limiting values for acidity and for moisture, ash, cellulose and N contents; ingredients and composition of egg pasta and other special pastas; and detection of soft wheat in pasta products. AJDW

## 20

Functional proteins.

Phillips, D. J.; Jones, D. T.; Palmer, D. E. (Viscose Group Ltd.)

*United States Patent* 4 218 490 (1980) [En]

A process for preparing edible water-containing foods, e.g. meringues, involves  $\geq 1$  of the steps of foaming, foam stabilizing, water binding, fat binding, and jelling by using a surface active protein agent prepared by the interaction of a surface active protein source, e.g. egg white, soy, milk etc. with an ion exchange material. RAW

21

Bowers expand Scotch egg production.

Anon.

*Food Trade Review* 50 (6) 305-306 (1980) [En]

22

[Eggs in human nutrition. Composition of hens' eggs.]

Staron, T.

*Medecine et Nutrition* 16 (5) 309-323 (1980) [47 ref. Fr, en] [Sta. des Antibiotiques & Bioconversions, INRA, 28110 Luce, France]

Aspects discussed include: world production and consumption of eggs; structure of eggs; physiology of the egg; yolk, albumen and shell contents; chemical composition (covering lipid fractions, protein fractions, sugars, minerals, vitamins and amino acid composition); shell defects; blood spots and other undesirable inclusions; off-flavours, colour abnormalities, etc.; microbial spoilage; candling; cleaning and surface disinfection; heat treatment of shell eggs; cold storage; frozen egg products; and dehydrated egg products.

AJDW

23

[Eggs in human nutrition. Process for preservation of shelled hard-boiled eggs.]

Staron, T.

*Medecine et Nutrition* 16 (5) 325-355 (1980) [1 ref. Fr, en] [Sta. de Antibiotiques & Bioconversions, INRA, 28110 Luce, France]

A process for manufacture of preserved hard boiled eggs, for use in the catering industry, is described. Eggs are boiled at 92°C for 12-15 min (after initial degassing for 4 min at ≤ 80°C), in an alkaline or acid solution to ease subsequent shell removal. The eggs are then cooled rapidly, shelled, and immersed in a preservative solution (pH 2.30-2.40) which may contain various combinations of citric and ascorbic acids, glucose, glycerol, NaCl and MgCl<sub>2</sub>. The eggs must be held in the preservative solution for at least 48 h, to adjust albumen pH to ≤ 4.5. They may then be stored in the preservative solution, or transferred to sealed packs (preferably vacuum packs). Exudation of protein, which is a major factor limiting storage life, is minimized by low albumen pH and presence of Mg<sup>2+</sup> ions. No significant changes were observed in the organoleptic properties or composition of eggs preserved by this method and stored for 2 months at 2-20°C. Shelf life of eggs hermetically packed in the preservative solution is approx. 3 yr at 4°C. Numerous tables and graphs of experimental data are given. AJDW

24

Hospital ready-prepared type foodservice system: time and temperature conditions, sensory and microbiology quality of scrambled eggs.

Cremer, M. L.; Chipley, J. R.

*Journal of Food Science* 45 (5) 1422-1424, 1429 (1980) [13 ref. En] [Ohio State Univ., Ohio Agric. R&D Cent., School of Home Economics, 1787 Neil Avenue, Columbus, Ohio 43210, USA]

Time and temp. conditions and sensory and microbiological quality of scrambled eggs were

examined (3 trials) at various phases of product flow in a hospital, "ready prepared" type foodservice to assess food quality as related to the system of operation. Average time from cooking to reheating for service was 26.3 h. Mean internal temp. were 10.6°C after 10 h refrigerator storage, 11.8°C at the beginning of assembly, 13.8°C after transportation for storage, and 5.2°C after 15 h additional storage. After reheating eggs in microwave ovens, internal temp. ranged from 35 to 92°C, average 67.1°C. Overall mean scores for sensory characteristics evaluated ranged from 6.9 to 8.1 (9-point scale). Total plate counts indicated that microbial quality of eggs was good both before and after cooking, but a variety of microorganisms was associated with the product. In uncooked eggs, these included *Bacillus* sp., *Clostridium sporogenes*, micrococci, including *Micrococcus luteus*, *Staphylococcus aureus*, *S. epidermidis*, *Escherichia coli*, *Enterobacter aerogenes*, *Proteus* sp., and *Alcaligenes* sp. At heating for service, eggs contained small numbers of *Bacillus* sp., *C. sporogenes*, *S. epidermidis*, *Escherichia coli*, and *Enterobacter aerogenes*. Low microbial counts within this system may be attributed to use of a pasteurized raw product and limited contamination, since time and temp. conditions were favourable for microbial growth. IFT

25

Investigations on the preparation of granular products.

Schmandke, H.; Muschiolik, G.

*Acta Alimentaria Polonica* 6 (3) 93-99 (1980) [4 ref. En, pl] [Cent Inst of Nutr., Acad. of Sci GDR, Potsdam, German Democratic Republic]

Granular protein products which simulate fish roe or may be used as carriers for meat or fruit flavours were prepared by dropping a protein suspension into hot vegetable oil. Proteins investigated were (i) dried wheat gluten, (ii) dried whole egg and (iii) dried bovine blood plasma, using 3 levels of aqueous suspension. Measurements were made of viscosity (by Rheotest cylinder), droplet forming ability (subjective visual observation) and firmness (Firmness Testing Machine BPG50) using shear force through a 0.05 mm slit. Viscosity was influenced mainly by gluten; too high a concn. prevented droplet formation. Bovine blood plasma had a major influence on firmness of suspensions after short heating times and on spherical shape and texture of granules (e.g. to simulate fish roe). An ideal formula for drop formation was (i) 15%, (ii) 6% and (iii) 6%. Suspensions were deaerated, and coagulated by dropping through a 2-3 mm cannula into vegetable oil (sunflower seed) at 110°C, followed by continuous removal of the protein granules (diagram given). With long time heating (e.g. canning) gluten produces excessive hardness. ELC

26

Observations on the weeping of double boiler scrambled egg products and its prevention.

Chen, T. C.

*Journal of Food Science* 46 (1) 310-311 (1981) [2 ref. En] [MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Experimental scrambled egg products were prepared with liquid whole eggs or liquid egg whites as the major

ingredient. Effects of ingredients, length of cooking time and holding time on the weeping of double boiler cooker products were observed. For both types of products, longer cooking time resulted in products with lower weeping vol. Presence of yolk greatly reduced the weeping. Most of the weeping occurred within the first 5 min of cooking and reached a max. between 20 and 30 min of holding. A slight reabsorption of the weeping fluid was observed for some of the products after 40 min holding. Addition of carboxymethylcellulose either reduced or prevented weeping. IFT

## 27

[Hydrogen sulphide concentration in egg products.]

Cantoni, C.; Radaelli, A.; Cattaneo, P.

*Industrie Alimentari* 19 (10) 749-752 (1980) [11 ref. It. en] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli Studi, Milan, Italy]

As H<sub>2</sub>S is produced when white and/or yolk of egg is heated above pasteurization temp. (73-74°C) or contaminated by pseudomonads, research was carried out into ways of assessing the freshness of raw materials used for manufactured egg products. Egg samples ((i) 13 of dried white, (ii) 12 of dried yolk, (iii) 5 of dried whole egg, and (iv) 5 of frozen mixed whole egg, of good microbiological quality, and (v) 5 as (iv) but contaminated by pseudomonads) were analysed for H<sub>2</sub>S concn. by colorimetry using dimethyl-p-phenylene diamine reagent and protein and moisture contents [Pearson, H. (1976) *The chemical analysis of foods*; Butterworths]. Results (tabulated) showed considerable variation in H<sub>2</sub>S concn.: (i) 14.62-139.74, (ii) 42.16-102.34, (iii) 9.86-169.32, (iv) 72.76-199.58, (v) 214.54-503.20 mg/g protein), evidencing a lack of consistent quality. All the samples affected by *Pseudomonas* sp. had extremely high H<sub>2</sub>S concn. It is claimed that such detn. affords an excellent check on the freshness and microbiological quality of egg product ingredients. KME

## 28

[Machine for preparing hard-boiled eggs for shelling.]

Societe Francaise d'Equipments Collectifs; France Ponte

*French Patent Application* 2 445 109 (1980) [Fr]

In a machine for preparing hard-boiled eggs for shelling, eggs travel along ≥ 1 moving surface from the entrance to the exit, the surface being subject to a high frequency vibratory movement, thus loosening the eggs from the shell interior. W&Co

## 29

[Prevention of the green-gray discolouration in cooked liquid whole eggs.]

Gossett, P. W.; Baker, R. C.

*Journal of Food Science* 46 (2) 328-331 (1981) [9 ref. En] [Dep. of Poultry & Avian Sci, Rice Hall, Cornell Univ., Ithaca, New York 14853, USA]

Prevention of the green-gray discolouration of cooked liquid whole eggs was studied. Acidic chelating agents were added to raw liquid whole egg samples at pH 8.50.

Samples were cooked at 100°C for 20 min, held over a steam bath for 60 min, and then measured for colour. Results show that the following approx. optimum concn. will prevent discolouration at p (number of green samples after cooking/number of samples) = 0.05: acetic acid, 0.19%; citric acid, 0.17%; sodium EDTA, 0.029%; lactic acid, 0.27%; malic acid, 0.22%; monosodium phosphate, 0.34%; propionic acid, 0.26%; and succinic acid, 0.27%. The average max. pH attained by raw liquid whole eggs when stored at 3°C for 21 days was 7.93 ± 0.19. A taste panel indicated that there were no significant differences in overall acceptability with the sodium EDTA and the monosodium phosphate treatments. The citric acid treatment was not significantly different from the control in flavour acceptability. Other treatments were judged to be inferior to the control. IFT

## 30

Milk and milk products, fresh, fluid, concentrated, and frozen.

United States of America, General Services Administration, Federal Supply Service

*Federal Specification* C-M-1678C, 31pp. (1977) [En] [Washington, DC 20406, USA]

This specification, which supersedes C-M-1678B:1977 [see FSTA (1978) 10 10U899] covers detailed requirements for different classes and forms of the following: fresh whole milk (pasteurized); fresh cream and half-and-half (pasteurized); fresh skimmed and low-fat milk (pasteurized); pasteurized, homogenized milk, frozen; flavoured milk (chocolate) and flavoured dairy drink (chocolate); and pasteurized fresh egg nog. It covers materials, processing, finished product requirements, quality assurance provisions, in-process examination, test methods, and preparation for delivery. AL

## 31

[Processed egg product.]

Snow Brand Milk Products

*Japanese Examined Patent* 5 548 775 (1980) [Ja]

Process is described in which fresh egg is combined with low methoxylated pectin and processed to give a product which can be freeze stored without damaging its flavour. IFT

## 32

Egg preservation in China.

Hou, H. C.

*Food and Nutrition Bulletin* 3 (2) 17-20 (1981) [8 ref. En] [Inst. of Nutr. & Hygiene, Acad. of Military Med. Sci., Shanghai, China]

Chinese processing methods for producing preserved eggs (pidan) are described. These include infusion, coating in alkaline mud by hand, and immersion. Duck eggs are generally preferred to hens' eggs. Pidan eggs may have semi-solid or hard yolks. The chemical changes during processing, caused by entry of NaOH, are described and changes in contents of amino acids, fatty acids and other nutrients are tabulated. Other processes are briefly outlined, i.e. production of salted eggs (Xiandan) and pickled eggs (Zaodan). RM

## 33

**Method of preparing foodstuffs containing coagulating proteins and a device for performing the method.**

Risman, P. O. G.; Bengtsson, N. E. (Husqvarna AB)  
**United States Patent 4 237 145 (1980) [En]**

Method of preparing foodstuffs from a mass containing meat, fish, eggs, etc., which coagulates during heating to impart hard consistency to the product, comprises pumping a paste of the mass enclosed in a microwave transparent tube through an applicator for exposure to microwave  $\text{TM}_{021}$  energy. When leaving the tube after treatment in the applicator, the prepared product is a hard extruded mass which can be handled in the same manner as a sausage. For eggs, the yolks and egg whites are pumped through concentric tubes before combination in the applicator. RAW

## 34

**[Effect of nisin and sodium polyphosphate in lowering heat resistance of bacteria in egg products.]**

Niewiarowicz, A.; Stawicki, S.; Kujawska-Biernat, B.; Laskowska, D.

**Medycyna Weterynaryjna 36 (5) 303-306 (1980)**  
 [10 ref. Pl, ru, en] [Inst. Tech. Zywosci Pochodzenia Zwierzecego, AR, 60-637 Poznan, Poland]

In laboratory experiments, egg white or whole-egg contents from fresh market eggs were divided into uniform 100-ml samples which were kept frozen at  $-18^{\circ}\text{C}$  and were defrosted at  $6^{\circ}\text{C}$  for 24 h before tests. Samples were contaminated with a culture of a strain of *Staphylococcus pyogenes* [? *Staph. aureus*] isolated from cases of meat-product poisoning, or with a culture of an *Escherichia coli* strain, both at about 2 million cells/g. Nisin (0.02%) and/or sodium polyphosphate (0.5%) were added, and 20-ml portions of the samples were pasteurized by heating in beakers in a water-bath at  $55\text{--}60^{\circ}\text{C}$  and pH 6.9-7.0 or 9.1-9.2 for egg white and 7.5 for whole egg, durations being 90 s for egg white and 120 s for whole egg. Appropriate controls were used for each variant. The results are tabulated in detail. It is concluded that both nisin and polyphosphate lowered the heat resistance of the test strains, polyphosphate being preferred as nisin acted only on Gram-positive bacteria; and that the best effect was obtained from joint use of both, enabling effective pasteurization at  $56^{\circ}\text{C}$ . SKK

## 35

**Chemical and organoleptic characterization of flavor changes during storage of hard-cooked egg albumen and yolk.**

Verstrate, J. A.  
**Dissertation Abstracts International, B 41 (6) 2108:**  
 Order no. 8025967, 132pp. (1980) [En] [Washington State Univ., Pullman, Washington 99163, USA]

Sensory analyses were used to describe the flavour changes in albumen, yolk and whole egg of peeled hard boiled eggs stored at  $2^{\circ}\text{C}$ . Triangle tests showed flavour changes were more easily discernible in albumen than whole egg and yolk and after 1 week storage at  $2^{\circ}\text{C}$ . Quantitative Descriptive Analysis (QDA) showed a decrease in 'sulphury' and an increase in ' $\text{NH}_3$ ' aroma and flavour of albumen. Chemical analyses showed that

the  $\text{H}_2\text{S}$  content of albumen decreased from 16.6  $\mu\text{g/g}$  of fresh cooked albumen to  $<0.5 \mu\text{g/g}$  of albumen stored for 1 week at  $2^{\circ}\text{C}$ .  $\text{NH}_3$  average content of 4.7  $\mu\text{g/g}$  of fresh cooked albumen did not change significantly during storage. QDA panel scores showed the major flavour differences taking place during storage of yolk to be an increase in 'wet feather' aroma and stale, 'cardboardy' flavour; the 'sulphury' aroma note was prominent but changed only slightly during storage.  $\text{NH}_3$  concn. was higher in yolk than albumen but was not detected by the QDA panel in aroma or flavour;  $\text{H}_2\text{S}$  concn. was 0.84  $\mu\text{g/g}$  yolk. Gas chromatography-MS analysis identified 9 volatile components from hard-boiled albumen. All compounds identified in volatiles of albumen were also present in yolk volatiles. SP

## 36

**[Radiation pasteurization of frozen broken-out eggs.]**  
 Niewiarowicz, A.; Fiszer, W.; Zabielski, J.; Starega, M.  
**Medycyna Weterynaryjna 36 (6) 365-367 (1980)**  
 [19 ref. Pl, ru, en] [Inst. Tech. Zywosci Pochodzenia Zwierzecego, AR, Poznan, Poland]

150-g portions of broken-out class A eggs packaged in polyethylene bags were frozen at  $-12^{\circ}\text{C}$  and exposed to 0.25 Mrad radiation from a  $^{60}\text{Co}$  source. Irradiated and control samples were stored at  $-12^{\circ}\text{C}$  for 76 days, and then at  $1^{\circ}\text{C}$  for 5 days. Bacteriological examination, determination of free fatty acids, and the thiobarbituric acid test were carried out at intervals. Organoleptic assessments were also conducted on sponge cakes made at the same times from the different types of egg. The total bacterial count of control samples was initially 2600/g and increased only slightly during frozen storage but rose rapidly to 10 million/g after the additional 5 days; *Pseudomonas* contamination was 130/g initially and 800/g after frozen storage; no *Escherichia coli* was detected. The irradiated samples remained sterile throughout. Free fatty acid contents were lower in the irradiated samples during frozen storage, but increased very rapidly thereafter in all samples. Irradiation stimulated oxidative processes in the frozen samples. Irradiation had no effect on sensory assessment of the sponge cakes in triangular panel tests, though a slight change in taste and aroma was noticed in cakes made with eggs irradiated at 0.5 Mrad. SKK

## 37

**[Method of test for salted eggs.]**  
 Taiwan, National Bureau of Standards  
**Chinese National Standard CNS N6038, 1p. (1980)**  
 [Ch]

## 38

**[Method of test for alkalinized eggs.]**  
 Taiwan, National Bureau of Standards  
**Chinese National Standard CNS N6039, 2pp. (1980)**  
 [Ch]

## 39

**[Method of test for frozen eggs.]**  
 Taiwan, National Bureau of Standards  
**Chinese National Standard CNS N6050, 2pp. (1980)**  
 [Ch]

# EGG SHELLS

1

**The correlation between egg shell color and specific gravity as a measure of shell strength.**

Grover, R. M.; Anderson, D. L.; Damon, R. A., Jr.  
*Poultry Science* 59 (6) 1335-1336 (1980) [4 ref. En]  
 [Dep. of Vet. & Anim. Sci., Univ. of Massachusetts, Amherst, Massachusetts 01003, USA]

A small (+ 0.175) but highly significant ( $P < 0.01$ ) correlation coeff. between shell colour and sp. gr. was revealed as a result of examining 3341 eggs produced by a popular brown egg strain of layers over a 15 wk period. It was not conclusively shown that a progressively higher correlation noted over time was associated with advancing age of birds. AS

2

**[Scanning electron microscopy of the structure of abnormal hen's eggshell.]**

Fujii, S.; Watari, T.; Tamura, T.  
*Journal of the Faculty of Applied Biological Science, Hiroshima University* 19 (1) 101-111 (1980) [14 ref. Ja, en] [Fac. of Applied Biol. Sci., Hiroshima Univ., Fukuyama, Japan]

3

**Proceedings, 1979 Georgia Nutrition Conference for the Feed Industry.** [Conference proceedings]

United States of America, University of Georgia; United States of America, Georgia Feed & Grain Association; United States of America, American Feed Manufacturers Association  
 128pp. (1979) [many ref. En] Athens, Georgia, USA.  
 Price \$4.00

Papers presented at the 1979 Conference which was held at the Marriot Motor Hotel, Atlanta, Georgia on 14-16 Feb. 1979, include: Genetics and carcass composition, by K. W. Washburn (pp. 34-43, 21 ref.). Nutritional factors affecting the carcass quality of broilers, by I. Bartov & S. Bornstein (pp. 44-55, 32 ref.). Influence of excessive magnesium on laying hens [including shell quality], by W. M. Britton (pp. 63-66, 6 ref.). The phosphorus requirement of laying hens [including egg quality], by J. D. Garlich (pp. 104-114, 42 ref.). VJG

4

**[Effects of Ca level and source in the diet on the performance of laying hens and the shell quality of the eggs.]**

Petersen, V. E.; Hoj, F.  
*Beretning fra Statens Husdyrbrugsforsog* No. 504, 53pp. (1980) [29 ref. Da, en, de] [Statens Husdyrbrugsforsog, Rolighedsvej 25, 1958 Copenhagen V, Denmark]

Groups of White Leghorn laying hens, 23 wk of age at the start of the experiment, were used in a 40 wk study on effects of Ca content of the diet (1.8, 2.2, 2.6, 3.0, 3.4 or 3.8%) and dietary Ca source (powdered limestone, or limestone + oyster shell) on laying

performance, and shell quality of the eggs. Tables are given for shell % of the eggs and Ca content of the egg shells. % shell of the eggs was found to increase with increasing dietary Ca level of the diet. For diets containing 3.0% Ca, limestone + oyster shell gave eggs with a higher % shell than the diets with limestone alone. Optimum shell quality was achieved with diets containing 3.4% Ca as limestone, or 2.6-3.0% Ca as limestone + oyster shell. Individual hens differed in dietary Ca requirement for good shell quality. AJDW

5

**[Effect of dietary krill (*Euphausia superba*) on egg shell and egg yolk colour in chickens.]**

Yamamoto, Y.; Oda, K.; Senda, H.  
*Japanese Poultry Science [Nihon Kakin Gakkai-shi]* 16 (3) 141-143 (1979) [11 ref. Ja, en] [Lab. of Zootech. Sci., Fac. of Agric., Tottori Univ., Tottori City, Japan]

Antarctic krill was evaluated as a poultry feed ingredient. Average shell strength of eggs from hens fed a diet containing 7% krill was increased by a statistically insignificant amount. The carotenoid of the krill was found to have a strong pigmenting action on the egg yolk, and if used as sole source of pigment caused the colour to become too red. 5-7% krill in the diet gave an unacceptably red yolk colour; 3% krill gives better results. [From En summ.] JRR

6

**The influence of the cuticle on egg-shell strength.**

Belyavin, C. G.; Boorman, K. N.  
*British Poultry Science* 21 (4) 295-298 (1980) [10 ref. En] [Harper Adams Poultry Husbandry Exp. Unit, Edgmond, Newport, Shropshire TF10 8HY, UK]

60 eggs free from defects and assumed to have shell cuticle, were paired according to egg-shell deformation value. Egg wt. and shell quality characteristics were recorded for the eggs; the cuticle was then removed from one egg of each pair. Egg wt. and shell quality were re-assessed for the eggs from which the cuticle had been removed. The cuticle made a significant ( $P < 0.01$ ) contribution to shell thickness, and its removal appeared to reduce shell strength when measured directly; however, the method of measurement was too variable to establish this with statistical significance. AS

7

**Factors influencing shell quality of aging hens.**

Roland, D. A., Sr.  
*Poultry Science* 58 (4) 774-777 (1979) [6 ref. En]

[Poultry Sci. Dep., Agric. Exp. Sta., Auburn Univ., Auburn, Alabama 36830, USA]

2 experiments were conducted in which eggs were collected from hens of different ages or from individually caged hens during their first 10 months of lay. Shell wt., egg wt., sp. gr., egg production, and shell thickness were the criteria evaluated. Results indicated that the total amount of shell deposited on the egg at 3-months of lay did not decrease but remained fairly constant or increased slightly throughout the remainder of the laying period; however, an increase in egg wt.

with no proportionate increase in shell deposition resulted in a decline in shell quality (shell thickness and sp. gr.). Neither the number of eggs laid by the hen nor absolute egg size had any influence on shell quality. However, shell quality at the end of lay was directly related to shell quality at the beginning of lay. AS

## 8

**Prevalence of salmonellae on eggs from poultry farms in New York State.**

Baker, R. C.; Goff, J. P.; Timoney, J. F.

*Poultry Science* 59 (2) 289-292 (1980) [12 ref. En] [Dep. of Poultry Sci., Cornell Univ., Ithaca, New York 14853, USA]

The purpose of this study was to determine the prevalence of salmonellae on egg shells. 100 eggs from each of 14 Central New York poultry farms were tested for *Salmonella* contamination of the shell. The egg contents were examined in eggs positive on shell culture. Only 0.21%, i.e. 3 of the egg shells yielded salmonellae, all of which were identified as *S. typhimurium*. No salmonellae were found in the contents of these eggs. Feed samples from 12 farms were also negative for salmonellae. From this study it would appear that the incidence of salmonellae on eggs from Central New York poultry farms is very low. AS

## 9

**Source of carbon for the biosynthesis of eggshell carbonate in the hen. Comparison of six  $^{14}\text{C}$  labeled compounds as sources of carbon in eggshells, albumen and yolk.**

Cipera, J. D.

*Poultry Science* 59 (7) 1529-1537 (1980) [18 ref. En] [Anim. Res. Inst. Agric. Canada, Cent. Exp. Farm, Ottawa, Ontario, Canada K1A 0C6]

## 10

**The removal of egg shell membranes by enzyme treatment to facilitate the study of shell microstructure.**

Stevenson, I. L.

*Poultry Science* 59 (8) 1959-1960 (1980) [7 ref. En] [Chem. & Biol. Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ontario, Canada K1A 0C6]

## 11

**Proceedings 1980, Cornell Nutrition Conference for Feed Manufacturers. November 4, 5 & 6, 1980, Sheraton Motor Inn, Syracuse, New York.**

[Conference proceedings]

United States of America, Cornell University, New York State College of Agriculture & Life Sciences;

United States of America, American Feed

Manufacturers Association

130pp. (1980) [many ref. En] Ithaca, New York, USA

This publication gives the text of papers presented at this conference, including Fluorosis in the laying hen, by G. F. Combs, Jr. and B. van Toledo (pp. 91-93, 7 ref.) giving data for egg shell quality of Cornell hen high and low eggshell strength (HES and LES, resp.) strains fed a corn-soybean diet + 0, 300, 600, 900 or 1200 p.p.m. NaF for 8 wk. followed by 4 wk on the NaF-free control diet.

manifest as a decrease in % shell in the HES line fed over 4 wk from 9.04 to 7.47; breaking strength fell from 3.50 to 2.90 kg, and shell thickness from 351 to 297 mm [ $\mu\text{m}$ ?]. HES hens were more sensitive to fluorosis than LES lines. LH

## 12

**[Effect of chlorinated hydrocarbons on the egg shell quality of Japanese quails (*Coturnix coturnix japonica*). II. Effects of polychlorinated biphenyls.]**

Die Wirkung chlorierter Kohlenwasserstoffe auf die Eischalenqualität der japanischen Wachtel (*Coturnix c. japonica*). II. Der Einfluß von polychlorierten Biphenylen (PCBs).

Hartner, L.; Faber, H. von

*Archiv für Geflügelkunde* 44 (5) 189-191 (1980) [9 ref. De, en, fr, ru] [Inst. für Zoophysiologie, Garbenstrasse 30, 7000 Stuttgart 70-Hohenheim, Federal Republic of Germany]

Groups of Japanese quails were fed diets with 0, 50,

250 or 500 p.p.m. polychlorinated biphenyl (PCB) as Clophen A60, starting at 5 or 9 wk of age. Eggs laid by the quails were collected during days 12-18 and 29-36 of the laying period, and the average wt. of individual eggs, wt. of the total eggs laid over a 7-day period, breaking strength, thickness, wt. and sp. gr. of the shell, and the surface area of the eggs were determined.

Tables of results are given. The results show that shell quality characteristics deteriorate with increasing PCB concn. in the diet. Adverse effects of PCB on shell quality were greater for young than for older birds. [See FSTA (1980) 12 12Q200 for part I.] AJDW

## 13

**[Effect of chlorinated hydrocarbons on the egg shell quality of Japanese quails (*Coturnix coturnix japonica*). III. Effects of methoxychlor and combined DDT/polychlorinated biphenyl treatment.]** Die

Wirkung chlorierter Kohlenwasserstoffe auf die Schalenqualität der japanischen Wachtel (*Coturnix c. japonica*). III. Der Einfluss von Methoxychlor sowie von einer kombinierten PCB- und DDT-Behandlung.

Hartner, L.; Faber, H. von

*Archiv für Geflügelkunde* 44 (5) 192-195 (1980) [7 ref. De, en, fr, ru] [Inst. für Zoophysiologie, Garbenstrasse 30, 7000 Stuttgart 70-Hohenheim, Federal Republic of Germany]

Groups of Japanese quails received diets containing 250 p.p.m. methoxychlor, 250 p.p.m. polychlorinated biphenyl (PCB), 250 p.p.m. PCB + 250 p.p.m. p,p'-DDE, 250 p.p.m. PCB + 250 p.p.m. p,p'DDT or 250 p.p.m. PCB + 250 p.p.m. o,p'-DDT, starting at 5 wk of age. Control birds received diets without added organochlorine compounds. Eggs laid by the various groups were collected during days 12-21 and 38-45 of the laying period; the wt. of individual eggs, wt. of eggs laid over a 7-day period, the breaking strength, thickness, sp. gr. and wt. of the shell and the surface area of the eggs were determined; tables of results are given. The results show that dietary methoxychlor does not impair shell quality; synergistic adverse effects of PCB and DDT or DDE were observed. [See preceding abstr. for part II.] AJDW

## 14

**Electron and X-ray diffractioal crystallographical studies about the egg shell of domesticated and wild birds.** (In 'Proceedings of the II International Conference on physical properties' [see FSTA (1981) 13 (11A671]) [Lecture]

Veres, I.; Bidlo, G.; Ernhaft, J.; Öcsenyi, A.  
IV/2, Paper 154, 3pp. (1980) [4 ref. En] [Univ. of Agric.  
Sci, Gödöllő, Hungary]

Egg shells of goose, turkey, hen, pheasant, quail, wild duck and wild turkey were studied by electron- and X-ray diffraction. All the shells contained  $\text{CaCO}_3$  as calcite. No aragonite was detected. The biological causes of this observation are discussed and the methods used are evaluated. RM

## 15

**Effects of the addition of silica to the diet of the laying hen, with particular reference to egg-shell quality.**

Belyavin, C. G.

*Animal Feed Science and Technology* 6 (2) 157-161  
(1981) [11 ref. En] [Harper Adams Poultry Husbandry  
Exp. Unit, Edgmond, Newport, Shropshire, TF10 8H4  
UK]

Tetra SSL brown-egg-laying hens were used in a feeding trial over the age range 67-79 wk, on effects of addition of Kestrel 600 (a silica-rich product) to the diet on egg shell quality. Diets with 0, 10, 20, 30, 40 or 50 g Kestrel 600/kg feed were used. 1 g Kestrel 600 was calculated to contain 0.4 g Si. A table of results is given, including data for incidence of soft-shelled eggs, egg wt., egg sp. gr., and egg shell deformation under load. No significant effects of dietary Kestrel 600 on the egg characteristics studied were observed. Results of shell analysis were inconclusive, Si being detected in only 2 samples (one a control). AJDW

# EGG WHITES

1

[Studies into inactivation and elimination of unspecific inhibitors in microbiological inhibitor test.] Untersuchungen zur Inaktivierung und Ausschaltung unspezifischer Hemmstoffe im mikrobiologischen Hemmstoff-Test.

Janetschke, P.; Schüppel, H.; Hörligk, C.

*Monatsshefte für Veterinärmedizin* 34 (21) 824-826 (1979) [24 ref. De, en, ru] [Sektion Tierproduktion & Veterinärmed., Karl-Marx-Univ., Leipzig, German Democratic Republic]

Non-specific inhibitors may interfere in detn. of erythromycin residues in egg albumen by the agar well test using *Bacillus subtilis* ATCC 6633. A technique for elimination of interference by high mol. wt. components was developed, based on use of a dialysis membrane, fixed on the Petri dish by means of a special holder, which prevents migration of high mol. wt. substances from the sample into the agar. Use of this method permits reliable detection of antibiotic residues causing inhibition zones of only 1-5 mm. IN

2

A comparison of heat-induced gel strengths of bovine plasma and egg albumen proteins.

Hickson, D. W.; Dill, C. W.; Morgan, R. G.; Suter, D. A.; Carpenter, Z. L.

*Journal of Animal Science* 51 (1) 69-73 (1980) [12 ref. En] [Dep. of Anim. Sci., Texas A&M Univ., College Station, Texas 77843, USA]

The heat-induced gel strength in suspensions of 2 types of plasma protein isolates and egg albumen were compared to investigate the use of bovine blood plasma in food systems as a replacement for egg albumen and other proteins. A viscosity index, based on a counter-flow back-extrusion model, was used to measure gel strength. The optimum pH for gel formation was 7.0 for phosphated and nonphosphated plasma protein suspensions and 9.0 for egg albumen. The protein gel strengths were compared at 8% protein concn. and at their respective pH optima. The gel strength of heated bovine plasma protein suspensions was greater ( $P < 0.01$ ) than that of egg albumen, indicating that blood plasma exhibited a superior binding ability. The addition of controlled low levels of Na and Ca increased ( $P < 0.05$ ) the binding ability of both pl protein isolates, while egg albumen showed no changes ( $P > 0.05$ ). Greater concn. substantially decreased ( $P < 0.01$ ) the gel strength in both types of heated plasma protein suspensions and egg albumen, revealing that all 3 protein types exhibited an ionic strength dependency. AS

3

Improved monomolecular fat film method for determination of yolk in egg albumen.

Taber, L. E.

*Journal of the Association of Official Analytical Chemists* 63 (4) 939-940 (1980) [2 ref. En] [Seymour Foods, Inc., 101 N. Kansas Avenue, Topeka, Kansas 66601, USA]

The monomolecular film method can be simplified by an improved quantitation procedure. Following extraction of the fat from albumen and subsequent evaporation, the redissolved sample is applied to a round glass plate containing 2 cm depth pH 5 acetic acid solution topped by a film of oxidized oil sufficient to exhibit a colour of third order green. The sample aliquot is dropped from a 100 µl Hamilton syringe directly at the centre of the oil surface. A circular pattern results. The diam. of the pattern is measured in cm with a ruler placed under the glass plate. The area of the pattern is then calculated by the formula for the area of a circle. AS

4

[Effect of ultrafiltration on properties of dried egg white during storage.]

Lobzov, K. I.; Mukoseeva, Z. A.; Erokhina, O. P.

*Myasnaya Industriya SSSR* No. 6, 38-40 (1979) [8 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsopererabatyvayushchei i Kleezhelatinovoi Promyshlennosti 'Kompleks', USSR]

Physico-chemical properties of egg albumen after ultrafiltration were monitored during drying and storage. Ultrafiltration leads to a reduction of sensitivity of proteins to heat; such albumen can be dried at higher temp. without impairing the functional properties. The efficiency of the drying unit is thereby increased by a factor of 2. Dried albumen prepared from raw material conc. by ultrafiltration has better storage stability than that prepared from non-conc. raw material. STI

5

Characterization of whey protein gels using a temperature gradient block.

Dunkerley, J. A.; Hayes, J. F.

*New Zealand Journal of Dairy Science and Technology* 15 (2) 191-196 (1980) [2 ref. En] [Dairy Res. Lab., Div. of Food Res., CSIRO, Highett, Victoria 3190, Australia]

Gelation of whey protein concentrates (WPC) on heating is an important functional property. The procedure developed involves the preparation of gels from 10%-protein dispersions of spray-dried whey protein concentrates in 10 mm wide tubes by heating for 40 min in a temp. gradient block giving typically a temp. range of about 70-100°C. Gel strengths are tested in the tubes with an Instron Universal Tester. Gel strengths were more variable from WPC than from agar or gelatin but the method can differentiate between samples of differing characteristics. Effect of pH on gel strength is illustrated for egg white at pH 7-9.25 and for WPC at pH 4.69-7.86. JMD

6

Effective thermal diffusivities of some protein gels.

Kong, J. Y.; Miyawaki, O.; Yan o, T.

*Agricultural and Biological Chemistry* 44 (8) 1905-1910 (1980) [21 ref. En] [Dep. of Agric. Chem., Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan]

1-dimensional non-steady-state heat conduction was studied on gels of soy protein (tofu), gelatin, egg albumen, milk casein and wheat gluten. These

heterogeneous foodstuffs could be treated as homogeneous materials for non-steady state heat conduction by using the 'effective' thermal diffusivity. Effective thermal diffusivity of soy protein gel depended not only on its water content but also on its fat content. Effective thermal diffusivities of non-fat protein gels with the same water content differed among different kinds of proteins. AS

## 7

[Process for obtaining dried egg white.]  
Lobzov, K. I.; Lyalin, V. A.; Mukoseeva, Z. A. (Union of Soviet Socialist Republics, Nauchno-proizvodstvennoe Ob"edinenie Ptitsopererabatyvayushchei i Kleezhelatinovoi Promyshlennosti 'Kompleks')  
USSR Patent 738 581 (1980) [Ru]

Process for obtaining dried egg white by concn., dispersion and spray-drying is characterized in that, in order to improve the quality and increase the yield of the product, concn. is achieved using a cellulose acetate membrane of mean pore diameter 0.3-0.5 µm at a flow rate of 0.35-0.6 m/s and a pressure of 4-5 atm; the dispersion produces particles of 140-180 µm; and drying is carried out with air at an initial temp. of 180-195°C and an end temp. of 55-65°C. The fraction of the dried product of particle size <15 µm is returned to the spray-drying inlet. W&Co

## 8

[Processed egg product.]

QP Corp.

*Japanese Examined Patent* 5 525 816 (1980) [Ja]

Egg white is mixed with glutinous rice powder, sodium alginate, a gum and water, the mixture then being extruded in an aqueous CaCl<sub>2</sub> solution to yield filaments, which are then heat coagulated and refrigerated. IFT

## 9

[Dried egg white.]

QP Corp.

*Japanese Examined Patent* 5 526 824 (1980) [Ja]

The foaming property and stability of egg white foams are improved by treating the separated whites with an alkali to raise the pH to 9.5-11.5, followed by neutralization and drying. IFT

## 10

Toxicity of organic mercury in sheep and hens.

Hilmy, M. I.; Rahim, S. A.; Abbas, A. H.; Taka, R. Y.

*Clinical Toxicology* 12 (4) 445-456 (1978) [17 ref. En]  
[Dep. of Physiol. & Biochem., Coll. of Med., Mosul Univ., Mosul, Iraq]

In view of a food poisoning outbreak caused by consumption of grain contaminated with methyl mercury (MeHg) in Iraq, relative toxicity (to sheep and hens) of crushed barley and wheat mixtures containing MeHg was studied. New Hampshire hens were fed MeHg-treated grain (8.5 p.p.m. Hg) for 50 days with a 50 day withdrawal period, and Hg concn. was

determined in various tissues, organs and eggs by flame photometry. The Hg concn. declined non-linearly with time post-application e.g. in muscle from 711 ng/g (wet wt.) at the end of the MeHg feeding period to 426 ng/g and 390 ng/g 25 and 50 days after MeHg feeding resp. The hens showed no ill effects, but there was a 25% reduction in egg production, and the eggs contained up to 2725 ng Hg/g whites and 1565 ng/g fresh yolks (higher than control levels). Lactating and non-lactating ewes were fed the same grain for 65 days with a 75 day recovery period. Lactating animals produced milk containing up to 26.8 ng Hg/ml (by flameless AAS) after 65 days treatment, the concn. declining to ≤ 6.1 ng at the end of the trial. Hg was not determined in the milk of control ewes. Lactating ewes flesh contained considerably less Hg than that of non-lactating ewes e.g. 5362, 1278, and 260 vs. 23 302, 15 922, and 692 ng/g in kidneys, liver and muscle resp. HBr

## 11

Separation of lysozyme from egg white. (In 'Food process engineering 1979' [see FSTA (1981) 13 4E167])  
[Lecture]

Ahvenainen, R.; Heikonen, M.; Linko, M.; Linko, P.  
Abstr. no. 4.1.14 (1979) [En] [Valio Lab., PO Box 176, SF-00180 Helsinki 18, Finland]

Lysozyme has potential applications in the food industry; a simple, improved ion exchange resin technique has been developed to separate lysozyme from egg white. No pretreatment of the egg white is required other than homogenization. Owing to its high viscosity, egg white is preferably adsorbed first on to the resin by a batch tank process. This is followed by washing and elution of the enzyme in a column operation, which achieves almost 100% recovery of lysozyme. ELC

## 12

[Protein additives in foods. Problems with their identification and determination.] Eiweisszusätze in Lebensmitteln - Probleme bei der Identifizierung und Bestimmung.

Reimerdes, E. H.

*Lebensmittelchemie und Gerichtliche Chemie* 34 (4) 87-91 (1980) [10 ref. De] [Bundesanstalt für Milchforschung, 2300 Kiel 1, Federal Republic of Germany]

Methods for detn. and identification of protein additives (casein, whey proteins, egg albumen, oilseed proteins, fish protein, single-cell protein) in foods are briefly considered, with reference to: specific tests for individual proteins: serological methods; electrophoretic techniques: end-group identification; methods based on characteristic constituents of the protein preparation (e.g. gossypol as an indicator of the presence of cottonseed protein); amino acid sequence analysis; and problems with effects of changes during processing (e.g. thermal denaturation, Maillard reactions) on identification and detn. of added proteins. AJDW

## 13

[Microwave heating for determination of moisture content in poultry meat products.]

Lukacka, J.; Schmidt, S.; Lacinova, D.

*Hydinarsky Priemysel* 22 (5/6) 202-211 (1980) [25 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Drying in the microwave oven ULTRA X Analysator 1-23C, Gronet A. (Federal Republic of Germany) was used experimentally for detn. of moisture content in liquid and dried egg whites and yolks, and in fresh chicken, hen, and duck meat. The results were in good accordance with those obtained by classical procedures, the time necessary for drying was shortened from about 1 h to 12 min. Curves expressing the course of drying with time are given. STI

## 14

Constituent proteins of globulin fraction obtained from egg white.

Nakamura, R.; Takayama, M.; Nakamura, K.; Umemura, O.

*Agricultural and Biological Chemistry* 44 (10) 2357-2362 (1980) [18 ref. En] [Lab. of Food Sci. & Nutr., Fac. of Agric., Tottori Univ., Koyama, Tottori 680, Japan]

A globulin fraction was obtained from egg white by precipitation from 0.43 saturated  $(\text{NH}_4)_2\text{SO}_4$ . Disc gel electrophoresis showed that the globulin fraction contained 5 proteins. A slow-moving band was assumed to be macroglobulin. 2 globulin bands were assumed to be the  $G_2$  and  $G_3$  described by Longsworth et al. [see *Journal of the American Chemical Society* (1940) 62, 2580]. The 2 remaining bands were possibly ovoinhibitors.  $G_2$  and  $G_3$  were purified from the globulin fraction and separated from each other by gel filtration on Sephadex G-200 followed by repeated chromatography on CM-cellulose. Amino acid compositions of  $G_2$  and  $G_3$  are tabulated. Their mol. wt. were similar, approx. 49 000, their amino acid compositions were similar, and both had similar carbohydrate compositions. An euglobulin-like fraction that precipitated during dialysis of the initial  $(\text{NH}_4)_2\text{SO}_4$  precipitate against water was also studied; this contained macroglobulin and aggregates of other globulins. DIH

## 15

Albumen quality of eggs laid during molt induction.

Nordstrom, J. O.

*Poultry Science* 59 (8) 1711-1714 (1980) [11 ref. En]

[Dep. of Anim. Sci., W. Washington Res. & Extension Cent., Washington State Univ., Puyallup, Washington 98371, USA]

2 experiments were conducted on 63 wk old Single Comb White Leghorn laying hens to determine the albumen quality of eggs laid during molt induction and those laid immediately upon resumption of lay following the molt. The first experiment utilized 1165 laying hens in group cages with 5-6 hens/cage. Light

was restricted from 16 h light/8 h dark to 8 h light/16 h dark, beginning 16 days prior to feed withdrawal. Feed was withheld for 7 days, with water available ad lib., followed by feeding grain or a 12% protein mash for 21 days. All hens were then fed their normal laying ration and light regime was restored to 16 h light/8 h dark. The second experiment utilized 588 laying hens in individual cages. Light was restricted to 8 h light/16 h dark for 6 days, beginning on the first day of molt induction. A molt was induced either by feed withdrawal for 6 days or by feeding laying mash containing 20 000 p.p.m. Zn (as  $\text{ZnO}$ ) for 6 days. Water was available ad lib. All hens then were fed their normal laying ration. In both experiments, albumen quality (Haugh units) increased dramatically in the eggs laid during molt induction, appearing as early as the second day after feed withdrawal. In eggs laid immediately following the molt, albumen quality was better than that observed just prior to molt induction but was not as good as that seen in eggs laid during molt induction. AS

## 16

Sample sizes required for predicting albumen quality in stored eggs from eight commercial stocks.

Hill, A. T.; Eissinger, R. C.; Hamilton, D. M.; Patko, J. *Canadian Journal of Animal Science* 60 (4) 979-989 (1980) [20 ref. En, fr] [Res. Sta., Agric. Canada, Agassiz, British Columbia V0M 1A0, Canada]

Eggs were collected from 8 commercial laying stocks (Heisdorf and Nelson, Shaver 288, Babcock 300, De Kalb, Hubbard, and HiSex white-egg layers, and Hubbard Comet and De Kalb Amber Link brown layers) which had been separated randomly into 4 groups of 68 pullets from each stock, and distributed throughout the laying house. When layers were 28, 36, 44, 48, 52, 56, 60, 64, 68, 72 and 76 wk old, samples of as near to 80 eggs as possible were obtained from each group on each of 2 successive wk. Eggs from wk 1 were cooled immediately to 10-12°C and 75-80% RH, and those from wk 2 were oiled and cooled. 20% of samples were broken and tested for Haugh unit score on days 1, 5, 12, 19 and 26 after collection, having been transferred during that time to several coolers to simulate the retail distribution chain. Various other trials were done, and statistical analysis was used to predict the sample size required for estimation of albumen quality in stored eggs. Sample size required to assure the mean Haugh unit score in the sample  $\pm 2.5$  units, 90% of the time, varied with age of layer, but not with days in storage or oiling. Haugh units lost varied by 1.8-22.1; implications of these losses are considered. LH

## 17

Chemical composition of the chalazae and their deterioration during storage of eggs.

Sato, Y.; Kato, T.

*Poultry Science* 59 (7) 1416-1422 (1980) [17 ref. En]

[Lab. of Food Sci. and Tech., Fac. of Agric., Nagoya Univ., Chikusa, Nagoya, Japan]

18

**Hen egg white: A novel support for the immobilization of enzymes [invertases].**

D'Souza, S. F.; Nadkarni, G. B.

*Biotechnology and Bioengineering* 23 (2) 431-436 (1981) [16 ref. En] [Biochem. & Food Technol. Div., Bhabha Atomic Res. Cent., Bombay 400 085, India]

19

**Replacement of egg albumen in food compositions.**

Chang, P. K. (Stauffer Chemical Co.)

*United States Patent* 4 214 009 (1980) [En]

It is claimed that the difficulties of replacing egg albumen with a whey protein concentrate (WPC) in food compositions such as cake mixtures can be overcome by replacing a portion of the albumen (dry solids basis) with a quantity of substantially non heat-denatured WPC containing preferably at least 35% protein. The WPC, prepared from acid Cottage cheese whey, is added in such an amount that the total protein content provided by the WPC and the albumen is, preferably, not less than 38% below the protein content of the egg albumen originally present in the recipe. The albumen replacement mixture also incorporates carboxymethylcellulose at a rate of 0.5-15% by wt. based on the wt. of the WPC. Examples are given of using the replacement mixture also to extend whole eggs and to replace up to 100% of milk solids in food mixtures. EJM

20

**Functionality of native and heat treated egg white and beef in a meat emulsion system.**

Raymond, D. P.; Randall, C. J.; Voisey, P. W.

*Canadian Institute of Food Science and Technology Journal* 13 (4) 174-177 (1980) [12 ref. En, fr] [Food Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ontario K1A 0C6, Canada]

The performance of native and heat treated egg white and beef was examined in a wiener-type product. All meat formulations were used as controls. These materials replaced 40% of the beef in both high and low protein formulations. Native and heat treated egg white improved cooking stability in the high protein formulation while only heat treated egg white compared favourably to the all meat controls in low protein formulations. All replacers had an adverse effect on texture with the exception of heat treated egg white in the high protein formulation. The level of protein and the physical state of the ingredient were found to affect comminution energy as measured by the Universal Food Rheometer. AS

21

**Effects of salts and denaturants on thermocoagulation of proteins.**

Shimada, K.; Matsushita, S.

*Journal of Agricultural and Food Chemistry* 29 (1) 15-20 (1981) [19 ref. En] [Res. Inst. for Food Sci., Kyoto Univ., Kyoto, Japan]

Thermocoagulation of proteins containing different amounts of hydrophobic amino acids was investigated with regard to the effects of salts and denaturants.

Formation of thermocoagulum of egg albumen was enhanced by addition of salts, and the effect of salts followed the lyotropic series. For bovine serum albumin, salts of the higher order on the lyotropic series enhanced formation of coagulum but those of the lower order inhibited it when salt concn. were increased. For soybean protein, increase in turbidity at alkaline pH were observed when salts were added, while formation of thermocoagulum was inhibited. Guanidine hydrochloride enhanced coagulum formation in a manner similar to that of salts. Sodium dodecyl sulphate and urea suppressed thermocoagulation. From the effects of salts and denaturants on thermocoagulation of these proteins, the mechanisms of coagulum formation can be surmised from the standpoint of the hydrophobic amino acid content of proteins. AS

22

**Protein binder in food compositions.**

Murray, E. D.; Maurice, T. J.; Barker, L. D. (General Foods Ltd.)

*United States Patent* 4 247 573 (1981) [En]

In a food composition comprising a food ingredient and egg white as a binder, the product is improved by substituting at least a binding-effective amount of  $\geq 1$  protein micellar mass, of e.g. animal serum, vegetable or microbial proteins, for at least a part of the egg white. Possible foods include muffins, pancake mixes, meat loaf, bacon analogues, etc. RAW

23

**Secondary structure prediction of chicken egg white ovomucoid.**

Matsuda, T.; Watanabe, K.; Sato, Y.

*Agricultural and Biological Chemistry* 45 (2) 417-423 (1981) [20 ref. En] [Dep. of Food Sci. & Tech., Nagoya Univ., Nagoya 464, Japan]

24

**Elimination of glucose in egg white by co-immobilized glucose oxidase and catalase.**

Kobayashi, T.; Ban, T.; Shimizu, S.; Ohmiya, K.; Shimizu, S.

*Journal of Fermentation Technology [Hakko Kogaku Zasshi]* 56 (5) 506-510 (1978) [5 ref. En] [Dep. of Food Sci. & Technol., Fac. of Agric., Nagoya Univ., Nagoya 464, Japan]

Glucose oxidase and catalase were immobilized together or separately by using polyacrylamide gel, and their characteristics were compared. For elimination of glucose in egg white, the gel immobilized together was superior to the gel immobilized separately. Oxidation of glucose to gluconic acid was found to follow the Michaelis-Menten kinetics. AS

25

**Egg albumen extender.**

Chang, P. K. (Stauffer Chemical Co.)

*United States Patent* 4 238 519 (1980) [En]

An egg albumen extender comprises  $\geq 65\%$  of a protein-containing composition from plant or animal sources, and a constituent selected from gelatin, water soluble polyphosphates, gums, or whipping aids. IFT

## 26

[Comparative studies on physical and chemical properties of avian eggs. III. Sodium dodecyl sulphate-polyacrylamide gel disc electrophoretograms of egg white of the chicken (*Gallus domesticus*), quail (*Coturnix coturnix japonica*), golden pheasant (*Chrysolophus pictus*), silver pheasant (*Gennaeus nycthemerus*), duck (*Anas platyrhynchos domestica*), muscovy duck (*Cairina moschata*) and pigeon (*Columba livia*).]

Tanabe, H.; Ogawa, N.

*Japanese Poultry Science [Nihon Kakin Gakkai-shi]* 17 (2) 74-79 (1980) [14 ref. Ja, en] [Dep. of Human Nutr. & Food Sci., Gifu Women's Coll., Taromaru, Gifu 501-25, Japan]

Electrophoretograms of the egg white proteins of 7 spp. were compared. Eggs of chicken were from White Leghorn, Rhode Island Red and Totenko breeds, and those of duck were from Khaki Campbell, Pekin and Naki breeds. The egg white proteins were separated into 14 bands in 10% gels. The mobilities of the bands were almost the same between spp., except in the case of the pigeon. Some differences in band densities were noted, relating to the classification of the birds into Anseriformes and Galliformes. In Galliformes, the density of band 2, corresponding to lysozyme, was highest in the silver pheasant, followed by the chicken and the golden pheasant. The band was faint in the quail and pigeon eggs (Columbiformes). In the Anseriformes, the density of lysozyme and ovotransferrin (band 12) were greater for the muscovy duck than for the domestic duck. [From En summ.] [See preceding abstr. for part II.] JRR

## 27

Use of various binders on the acceptability of chicken sausage.

Panda, P. C.

*Indian Poultry Gazette* 64 (2) 48-51 (1980) [6 ref. En] [Dep. of Anim. Products Tech., Haryana Agric. Univ., Hissar - 125 004, India]

Binders such as dried skim milk, semolina (suji), corn starch, and pasteurized egg white were added to a standard chicken sausage formulation, at levels of 0, 2.5, 5, 10, and 15%. Sensory tests showed no significant variation in the appearance and tenderness of the products. However, dried skim milk was found to give the best flavour and general acceptability of the product. Semolina lowered the juiciness of the product. CFTRI

## 28

[A sensitive determination procedure for lytic activity of lysozyme in foods.]

Tsumuraya, K.; Hidaka, Y.

*Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi]* 21 (2) 144-147 (1980) [8 ref. Ja, en] [Eisai Res. Lab., Eisai Co. Ltd., Koishikawa 4-chome, Bunkyo-ku, Tokyo, Japan]

A simple procedure for sensitive detn. of the lytic activity of lysozyme is presented. This procedure was carried out turbidimetrically at a higher temp. (60°C) and for a longer time (60 min) than in the conventional

method. In order to stimulate the lytic activity of lysozyme, small amounts of nonionic surfactant and NaCl were added to M/15 phosphate buffer, pH 6.2. With this procedure, it was possible to determine the lytic activity of hen egg white lysozyme at a concn. of 0 - 15 ng/ml of reaction solution. It was also possible to determine lysozyme added at low concn. to some kinds of foods which exhibit strong turbidity. AS

## 29

Firmness of heat induced albumen coagulum.

Beveridge, T.; Arntfield, S.; Ko, S.; Chung, J. K. L.

*Poultry Science* 59 (6) 1229-1236 (1980) [25 ref. En] [School of Food Sci., MacDonald Coll. of McGill Univ., Ste. Anne de Bellevue, Quebec, Canada H9X 1C0]

Studies were conducted on factors influencing the firmness of heat-coagulated egg albumen, including coagulation temp. (77°, 80°, 85°, 90°C), heating time ( $\leq 1$  h), dilution with water ( $\leq 50$  ml water/100 ml albumen), pH (4-9), salts (NaCl, CuSO<sub>4</sub>, AlCl<sub>3</sub>, FeCl<sub>3</sub>), oxidizing agents (KBrO<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>, KIO<sub>3</sub>), and digestion with proteolytic enzymes (papain, ficin, pronase) before heat treatment. Firmness of the coagulum was evaluated using a shear press equipped with a multi-blade shear-compression cell. Tables and graphs of results are given. Shear strength increased with increasing coagulation time and temp.; the increase in firmness was not linearly related to temp. It is suggested that an additional toughening reaction occurs at 80-85°C. Coagulum firmness decreased with increasing dilution with water. Coagulum firmness difficult to measure for coagulation pH < 7, due to formation of a puffy coagulum. Coagulum firmness was min. at pH 7, decreasing with further increases in pH. NaCl slightly softened the coagulum; FeCl<sub>3</sub> increased and CuSO<sub>4</sub> and AlCl<sub>3</sub> decreased coagulum firmness. KIO<sub>3</sub> markedly and H<sub>2</sub>O<sub>2</sub> slightly reduced coagulum firmness; KBrO<sub>3</sub> had little effect. Pre-treatment of the albumen with proteolytic enzymes gave mushy coagula. The relation of firmness to extractability of proteins and ultrastructure of the coagulum is also considered. AJDW



# EGG YOLKS

## 1

[Lipid and fatty acid composition of low density lipoprotein and high density lipoprotein of egg yolk.]

Tsutsui, T.; Obara, T.

*Journal of Japanese Society of Food Science and Technology [Nippon Shokuhin Kogyo Gakkaishi]* 26 (2) 81-88 (1979) [ja. en] [Dep. of Agric. Chem., Tokyo Univ. of Agric., Sakuragaoka Setagaya-ku, Tokyo, Japan]

Egg yolk was fractionated, using ultra-centrifugation, into 2 lipoprotein-containing fractions, low density lipoprotein (LDLP) and high density lipoprotein (HDLP). LDLP and HDLP contained resp., lipids 85.6 and 27.3%; total N, 2.4 and 10.9%; total P, 1.0 and 1.8%; and total S, 0.1 and 0.6%. Cellulose acetate membrane electrophoresis of LDLP showed only 1 band by protein staining; this band was also stained by an oil red stain and by the periodic Schiff reaction. HDLP was separated into 5 bands, one of which was stained by oil red stain. Lipids extracted with chloroform-methanol (2:1) from LDLP and HDLP differed in content and composition, the main difference being the composition of triglycerides, lecithin and cephalin. 93.9 and 67.9% non-polar lipids and 27.0 and 18.0% polar lipids were recovered with heptane from the chloroform-methanol extracts of LDLP and HDLP resp. Cephalin was more readily extracted with heptane than other phospholipids in LDLP and HDLP. Triglyceride, lecithin and cephalin in chloroform-methanol extracts of LDLP and HDLP had similar fatty acid compositions. Heptane extracts of LDLP and HDLP contained larger amounts of C16:0 fatty acids than chloroform-methanol extracts. [From En summ.] SP

## 2

Isolation of staphylococcal L-phase variants from the blood and egg yolk of normal chickens.

Buxton, A.; Phillips, J. E.

*Research in Veterinary Science* 29 (1) 51-56 (1980) [17 ref. En] [Dep. of Vet. Path., Royal (Dick) School of Vet. Studies, Edinburgh, UK]

The use of special microbiological media and modified techniques has resulted in the stimulation of growth and development of bacterial L forms in samples of blood and egg yolk free from mature bacteria and derived from normal healthy chickens. After prolonged cultivation the majority of these L form cultures reverted to staphylococci. AS

## 3

Isolation of hen's egg yolk low density lipoprotein by affinity chromatography.

Tsutsui, T.; Obara, T.

*Agricultural and Biological Chemistry* 44 (6) 1409-1410 (1980) [7 ref. en] [Seitoku Junior Coll. of Nutr., 4-6 Nishishinkoiwa 1-chome, Katsushika-ku, Tokyo, Japan]

Egg yolk, diluted 1:1 (w/w) with 0.16M NaCl, was centrifuged at 45 000 g<sub>n</sub> for 30 min, and the supernatant was applied to a stearyl-Sepharose 4B affinity column. The column was washed with 0.01M Tris-HCl pH 8.0

(the initial buffer) and 1.5M NaCl/0.001M Tris-HCl, pH 8.0. Livetin impurities were removed by 1 further stage of column chromatography on Sepharose 4B. The method is more effective and more rapid than the centrifugation flotation technique previously used for isolation of egg yolk low density lipoprotein. DIH

## 4

[Effect of dietary energy level on cholesterol content of egg yolk.]

Ferreira, M. O. O.; Campos, E. J.

*Arquivos da Escola de Veterinaria da Universidade Federal de Minas Gerais* 32 (1) 77-80 (1980) [20 ref. Pt. en] [Escola de Vet., Univ. Fed. de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil]

A total of 288 hens of 4 commercial lines (Hy-line, De Kalb, Shaver Starcross, G-307) was used in a feeding trial conducted to evaluate effects of 3 isonitrogenous diets differing in energy content (2700, 2850 or 3000 kcal metabolizable energy/kg feed) on the cholesterol content of the egg yolk. 9 batches of eggs were collected at 28-day intervals. Tables of results are given for cholesterol concn. in the egg yolk. In general, the cholesterol content of the yolk increased significantly with increasing energy content of the diet. The 4 commercial lines did not differ significantly in cholesterol content of the egg yolk, although Shaver Starcross consistently gave the highest and G-307 the lowest yolk cholesterol concn. In all groups, yolk cholesterol concn. tended to decrease during the experiment AJDW

## 5

Process for extracting oil from egg yolks.

Herring, N. I.

*United States Patent* 4 219 585 (1980) [En]

Separated, hard boiled yolks are heated at 375-400°F to release the oil component from the charred residue, the oil being sterile and medically pure. IFT

## 6

The emulsifying properties of whey protein concentrates in a model system.

Hayes, J. F.; Stranaghan, B.; Dunkerley, J. A.

*New Zealand Journal of Dairy Science and Technology* 14 (3) 259-264 (1979) [2 ref. En] [Dairy Res. Lab., Div. of Food Res., CSIRO, Highett, Victoria, Australia]

Preliminary investigation of the emulsifying properties of whey protein concentrates (WPC) was carried out on a simple homogenized system of WPC, water and oil, and on a more complex model representing a salad dressing. Spray dried egg yolk powder was used for comparison. It was essential to be able to record and standardize the homogenization pressure during a trial, to ensure reproducible conditions. Stability ratings (SR) and stability indices (SI) were calculated and the quantity of serum recorded before and after centrifuging. Both SR and SI increased and serum vol. decreased with the number of passes through the homogenizer. Stability indices and serum vol. were measured as each additional ingredient was added to make the salad dressing model. The results on the simple system bore little relationship to those using the salad dressing model because of interactions between components of the model. DMK

7

**Mild alkali-stable phospholipids in chicken egg yolks: characterization of 1-alkenyl and 1-alkyl-sn-glycero-3-phosphoethanolamine, sphingomyelin, and 1-alkyl-sn-glycero-3-phosphocholine.**  
 Do, U. H.; Ramachandran, S.  
*Journal of Lipid Research* 21 (7) 888-894 (1980)  
 [21 ref. En] [Applied Sci. Div., State Coll., Pennsylvania 16801, USA]

8

**Effect of increasing levels of Egyptian clover on the yolk pigmentation.**

Abou-Meddain, A. A.; Jihad, E. A.  
*Journal of Agricultural Research, Riyad University* 4, 95-105 (1979) [11 ref. En, ar]

100 Fayoumi (F) and 100 Rhode Island Red (RIR) hens were fed xanthophyll-deficient basal diets for 90 days and then split into 5 groups of 20 birds: (i) was fed the basal diet and acted as a control, (ii), (iii), (iv) and (v) were fed basal ration plus 7.5, 15.0, 30.0 and 45.0% Egyptian clover, resp. Egg yolk pigmentation was evaluated by total carotenoid content and Roche Yolk Colour Fan (RYCF) measurement. Diets (ii) and (iii) gave satisfactory egg yolk colour for RIR and F hens, resp. Average total carotenoids in diets (i)-(v) for RIR and F were 7.9 and 8.5, 15.0 and 22.1, 24.3 and 26.7, 25.0 and 27.6, and 25.1 and 31.1 mg/kg, resp. RYCF values generally ranged from 5 to 7. LH

9

**Studies on egg yolk pigmentation. I. The effect of different levels of dehydrated clover and seaweeds on yolk colour.**

Attia, F. M.; Mizyed, S. S.  
*Journal of Agricultural Research, Riyad University* 4, 117-125 (1979) [18 ref. En, ar]

54 Fayoumi hens were fed a carotenoid-deficient diet for 4 wk prior to being fed experimental diets supplemented with 6 or 9% of (i) dehydrated clover, (ii) fresh seaweed, (iii) stored seaweed or (iv) seaweed by-products, to study the effect of natural pigment sources on yolk colour and to compare a visual scoring method with a colorimetric method. 6 and 9% (i) or (ii) increased egg yolk colour, compared with the basal diet and diets (iii) and (iv); the increase was similar, probably due to the high xanthophyll contents of (i) (18.25 mg/kg) and (ii) (6.25 mg/kg). The similarity in the colour effects of (i) and (ii) is attributable to the fact that fresh seaweed xanthophyll is utilized more efficiently than that of clover. Diets (iii) and (iv) had a slight, detrimental effect on yolk colour, probably due to losses of carotene and carotenoid pigments. The visual scoring method, which involves the intact yolk, was found satisfactory for practical evaluation of yolk colour. LH

10

**An evaluation of the AOAC method of yolk color analysis.**

Fletcher, D. L.  
*Poultry Science* 59 (5) 1059-1066 (1980) [12 ref. En]  
 [Dep. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

Experiments were conducted to evaluate and compare several methods of egg yolk colour analysis. Egg yolks of various -Olours and intensities were produced either by feeding known concn. of synthetic xanthophylls to colour-depleted hens or by mixing the xanthophylls directly into depleted egg yolks. The yolk samples were then analysed for colour using the AOAC procedure, visual comparison using the Roche Colour Fan, or reflectance colorimetry to describe colour in the CIE and *L ab* systems. The AOAC procedure of  $\beta$ -carotene equivalents was found to be inadequate in describing yolk colour produced from different xanthophyll sources. Yolks blended to approx. the same total xanthophyll concn. from natural feed sources or from canthaxanthin resulted in about the same  $\beta$ -carotene equivalent values of 14.3 and 14.2  $\mu\text{g/g}$ , resp. Visual scoring resulted in a Roche Colour Fan value of 7 for the natural yolks and 15 for the canthaxanthin-blended yolk. Colorimetric analysis indicated that the natural yolk was more yellow and less red (578.4 nm dominant wavelength 2.74 *a* and 56.7 *b*) than the canthaxanthin yolk (591.9 nm dominant wavelength 25.60 *a* and 34.7 *b*). The AOAC procedure, however, shows good agreement with increases in a monopigment source of colour. These results indicate that the AOAC procedure is an adequate procedure for describing egg yolk colour from a monopigment source; however, it is a very poor procedure for describing egg yolk colour from a variety of pigments. AS

11

[DDT, DDE, DDD and HCH in depot fat and in egg-yolk fat of hens fed on different rations.]

Smoczyński, S.; Markiewicz, K.; Faruga, A.;

Tywoniuk, J.

*Zeszyty Naukowe Akademii Rolniczo Technicznej w Olsztynie, Technologia Zygnowosci* No. 15, 195-202 (1979) [15 ref. Pl, ru, en] [Inst. Fizyki & Chemii Zygnowosci, AR-T, Olsztyn, Poland]

Groups of 6 Rhode Island Red hens aged initially 6-7 months received for 12 wk (i) a control ration, (ii) a ration without animal protein supplement, (iii) a ration with 4% krill meal, or (iv) a ration with 8% krill meal. 2 eggs were collected from each hen every 2 wk; the hens were slaughtered at the end of the experiment, and contents of HCH, DDT, DDE, and DDD were determined in ration, intestinal, gizzard, and egg-yolk fats. Mean values tabulated for each variant include for HCH and DDT + DDE + DDD in (i)-(iv), resp. ( $\text{mg/kg}$  fat) ration, 0.03, 0.03, 0.02 and 0.03, and 0.12, 0.13, 0.04 and 0.07; intestinal fat, 0.003, 0.002, 0.002 and 0.002, and 0.08, 0.07, 0.10 and 0.06; gizzard fat, 0.002, 0.003, 0.003 and 0.001, and 0.07, 0.09, 0.08 and 0.07; and egg-yolk fat, 0.003, 0.004, 0.002 and 0.003, and 0.06, 0.09, 0.08, and 0.08. It is pointed out that the values are well below the WHO/FAO tolerance limits, and also lower than those found earlier in similar tests. [See FSTA (1976) 8 7S1206

## 12

[Fatty acid composition of yolk lipids of eggs in geese of different breeds and varieties.]

Markiewicz, K.; Smoczyński, S.; Faruga, A.; Majewska, T.

*Zeszyty Naukowe Akademii Rolniczo Technicznej w Olsztynie, Technologia Zywosci* No. 15, 189-194 (1979) [15 ref. Pl, ru, en] [Inst. Fizyki & Chemii Zywosci, AR-T, Olsztyn, Poland]

52, 54, 50, 54 and 36 eggs resp. were collected at random during 1 lay from geese consisting of 48 Italian White, 48 Pomorska and 48 Zatorska breeds, and 24 and 48 resp. Sawalki and Lublin var. of the Pomorska breed. The geese ranged in age from 1 to 3 yr; they were fed alike throughout the experiment. The extracted yolk lipids were analysed by GLC for constituent fatty acids (FA). Mean values with s.d. are tabulated for the 5 groups of eggs for contents of 10 individual FA and of total saturated and unsaturated FA. No significant differences in FA contents were found between the different groups. Linoleic acid contents ranged from 3.3 to 4.5% of total lipids. These values are lower than the value of 6.2% found by Jaworski & Budslanski [FSTA (1973) 5 9Q131]; values for linolenic and arachidonic acids were also lower. The differences are ascribed to differences in feeding. SKK

## 13

Studies on the apoproteins of the major lipoprotein of the yolk of hen's eggs. III. Influence of salt concentration during isolation on the amount and composition of the apoproteins.

Burley, R. W.

*Australian Journal of Biological Sciences* 31 (6) 587-592 (1978) [13 ref. En] [Div. of Food Res., CSIRO, PO Box 52, North Ryde, NSW 2113, Australia]

See FSTA (1978) 10 1Q4 for part II.

## 14

Studies on the apoproteins of the major lipoprotein of the yolk of hen's eggs. IV. Aggregation in urea of proteins of intermediate and high molecular weight and the isolation of four electrophoretically distinct proteins.

Burley, R. W.; Sleigh, R. W.

*Australian Journal of Biological Sciences* 33 (3) 255-268 (1980) [15 ref. En] [Div. of Food Res., CSIRO, PO Box 52, North Ryde, NSW 2113, Australia]

See preceding abstr. for part III.

## 15

An improved method for the analysis of phosphoglycerides.

Hsieh, J. Y.-K.; Turcotte, J. G.

*Journal of High Resolution Chromatography and Chromatography Communications* 3 (9) 481-482 (1980) [3 ref. En] [Bronx Veterans Admin. Hospital, Bronx, New York 10468, USA]

The separation and identification of multiple

phosphatidylcholine (PC) species in egg yolk, soybeans, etc. by preparation and HPLC of phosphatidic acid dimethyl esters (PAME) described by Hsieh [PhD dissertation, Univ. of Rhode Island 1979] was improved by using phosphatidic acid dibenzyl esters (PABE). Egg yolk PC was used as an example. RM

## 16

Pigmentation of egg yolks with astaxanthin from the yeast *Phaffia rhodozyma*.

Johnson, E. A.; Lewis, M. J.; Grau, C. R.

*Poultry Science* 59 (8) 1777-1782 (1980) [14 ref. En] [Dep. of Food Sci. & Tech., Univ. of California, Davis, California 95616, USA]

The red yeast *Phaffia rhodozyma* was tested as a dietary pigment source for egg yolks of laying hens and Japanese quail. It was found that astaxanthin from broken yeast or prepared yeast oil, but not that from intact yeast cells, was deposited in egg yolks. The efficiency of carotenoid deposition was approx. 4%, and it was only slightly dependent on the astaxanthin concn. in the diet. Astaxanthin was probably deposited without metabolic alteration in egg yolks. When *P. rhodozyma* was fed to laying hens at several concn. and in combination with marigold flower pigments or yellow corn, a wide range of colours was achieved; depending on the yeast concn. in the feed, the dominant wavelength of chicken egg yolks ranged from 571 nm to 593 nm. AS

## 17

Yoke [Yolk] colour in demand.

Raine, H.

*Poultry International* 19 (3) 112, 114, 127, 129 (1980) [En, de, fr, it, ja, ar, es]

The importance of a dark yellow-orange yolk colour for consumer acceptance of eggs is briefly considered, with reference to the importance of the natural xanthophyll content of the diet, use of synthetic carotenoids in the diet of laying hens, and factors influencing the efficiency of dietary pigment utilization by hens. AJDW

## 18

Studies on release of components from frozen-thawed low-density lipoprotein (LDL) of egg yolk.

Wakamatu, T.; Sato, Y.

*Journal of Food Science* 45 (6) 1768-1772 (1980) [26 ref. En] [Dep. of Food Sci. & Tech., Fac. of Agric., Nagoya Univ., Nagoya 464, Japan]

This experiment was carried out to confirm that the components of low-density lipoprotein (LDL) are not released from LDL during freezing and thawing. With the aid of ultrafiltration and gel filtration with Sephadex G 25, it was found that low mol. wt. material was not liberated from frozen-thawed LDL. However, in centrifugation, a small amount of precipitate was found in unfrozen LDL and frozen-thawed LDL, and this amount was greater in the frozen-thawed LDL than in the unfrozen LDL. Sp. gr. ranged from 1.02 to 1.04, and the phospholipid and protein contents of frozen-thawed and unfrozen LDL were higher than in the parent LDL. However, the SDS polyacrylamide gel electrophoretic patterns of the precipitates were the same as that of apo-LDL. IFT

**19**

[Effects of the feeding of iodine additives to hens on laying performance and egg quality.]  
 Nakajima, T.; Moriaki, K.; Okano, K.  
*Japanese Poultry Science [Nihon Kakin Gakkai-shi]*  
 17 (2) 83-87 (1980) [10 ref. Ja. en] [Fac. of Agric., Shiga Prefectural Junior Coll., Kusatsu City, Japan]

This experiment was conducted to determine the effects of the feeding of 3 different types of organic or inorganic iodine additives on the contents of iodine and cholesterol in eggs, and egg production in layers. The iodine content in yolk increased rapidly 4 days after the feeding of the additives. 9-11 days later it reached max. levels (19-23 µg) which were about 60-70 times greater than those of the control group, and were maintained during the feeding of the additives. When the feeding of the additives was suspended, the iodine content in yolk decreased sharply 5 days later, almost reaching the same levels as those of the control group 9 days later. The iodine content in albumen also increased gradually reaching max. levels (0.6-1 µg) 5 days after the feeding of the additives. It reached to the same levels as those of the control group 4 days after suspending the feeding of the additives. It is suggested that iodine fed additionally to layers is accumulated both in yolk and albumen, but the degree of the accumulation is much higher in yolk than albumen. There was no difference in iodine accumulation in the eggs among the 3 different types of iodine additives used. The content of cholesterol in yolk and laying performance were no affected by the additives. AS

**20**

Competitive deposition of trans-12- and cis-9-octadecenoates into egg yolk lipids.  
 Lanser, A. C.; Emken, E. A.  
*Lipids* 16 (1) 15-19 (1981) [34 ref. En] [Northern Reg. Res. Cent., USDA, Peoria, Illinois 61604, USA]

**21**

Chemical and physical properties of apolipoprotein of very low density lipoprotein from egg yolk granules.

Kocal, J. T.; Nakai, S.; Powrie, W. D.  
*Journal of Food Science* 45 (6) 1756-1760 (1980) [17 ref. En] [Dep. of Food Sci., Univ. of British Columbia, Vancouver, British Columbia, Canada V6T 1W5]

**22**

Preparation of apolipoprotein of very low density lipoprotein from egg yolk granules.

Kocal, J. T.; Nakai, S.; Powrie, W. D.  
*Journal of Food Science* 45 (6) 1761-1767 (1980) [47 ref. En] [Dep. of Food Sci., Univ. of British Columbia, Vancouver, British Columbia, Canada V6T 1W5]

Antioxidant effect of Gly-Gly-His on Cu(II)-catalyzed autoxidation and photosensitized oxidation of lipids.

Yamashoji, S.; Kajimoto, G.  
*Agricultural and Biological Chemistry* 44 (11) 2735-2736 (1980) [16 ref. En] [Fac. of Nutr., Kobe Gakuin Univ., Tarumi-ku, Kobe 673, Japan]

Effects of histidine and histidine-containing peptides on autoxidation and photosensitized oxidation of fatty acids, in the presence of Cu(II) ions, are discussed. Linoleic acid and egg yolk phosphatidylcholine (32.1% palmitic, 1.1% palmitoleic, 14.8% stearic, 28.6% oleic, 17.1% linoleic, and 6.0% arachidonic acids) were examined, and gly-gly-his acted as an ideal antioxidant in both Cu(II) catalysed oxidation processes, although the effects of histidine and its peptides depended on the reaction conditions. LH

**23**

Occurrence of dibutyl and di(2-ethylhexyl) phthalate in chicken eggs.  
 Ishida, M.; Suyama, K.; Adachi, S.  
*Journal of Agricultural and Food Chemistry* 29 (1) 72-74 (1981) [10 ref. En] [Lab. of Anim. Products Tech., Coll. of Agric., Tohoku Univ., Sendai 980, Japan]

Occurrence of phthalates, widely used in the plastics industry as plasticizers, in retail samples of hen eggs in Japan is reported. After extraction of lipids from yolks and whites with chloroform/methanol and concentration to dryness, residue of lipids from whites was dissolved in diethyl ether and analysed by GLC (1.5% SE-52 on Chromosorb W); lipids from yolks were treated with silicic acid before GLC. Limit of detection for dibutyl phthalate (DiBuP) and di(2-ethylhexyl) phthalate D(EtHx)P was 0.01 p.p.m. in egg white and 1.0 p.p.m. in egg yolk. Retail eggs produced in different regions of Japan were analysed; whites contained  $0.098 \pm 0.041$  p.p.m. DiBuP (range trace-0.15) and  $0.182 \pm 0.125$  p.p.m. Di(EtHx)P (range 0.05-0.40). Phthalates were not present in yolks above the limit of detection. In a study of effect of feeding hens Di(EtHx)P on contents of phthalate in eggs, hens were fed (i) a control diet, (ii) as (i) but with 1 g Di(EtHx)P/kg body wt. per day (by stomach tube) (iii), as (ii) but  $3 \text{ g kg}^{-1}$  day $^{-1}$ , or (iv) mash containing 1 g Di(EtHx)P/100 g. Levels of Di(EtHx)P found in egg white and yolk, resp., were as follows (p.p.m.): (i) 0.21 (range 0.01-0.41), not detectable; (ii) 0.57 (0.06-1.82), 43.64 (11.71-74.54); (iii) 1.96, 26.85; and (iv) 1.25 (0.72-2.28), 148.35 (9.44-254.88). DIH

**24**

Influence of bacitracin zinc and flavomycin on transfer of vitamin A to the egg.  
 Ferrando, R.; Palisse, M.; Jacquot, L.; Fourlon, C.  
*International Journal for Vitamin and Nutrition Research* 51 (1) 9-15 (1981) [4 ref. Fr. en] [Ecole Natl. Vet. d'Alfort, F-94704 Maisons-Alfort Cedex, France]

Laying hens of 2 breeds (Warren and Dekalb) were fed 3 diets comprising: (i) standard commercial poultry ration (composition given); (ii) diet (i) supplemented with 10 p.p.m. bacitracin; and (iii) diet (i) supplemented with 0.5 p.p.m. flavomycin. In a 1st laying trial under

commercial conditions, 17 eggs from each of (i), (ii) and (iii) groups were examined for yolk wt., vitamin A content of yolk, and xanthophyll content of yolk. Mean vitamin A levels from (i), (ii) and (iii) resp. were (IU/g) Warren breed 25.7, 28.3 and 34.7 and Dekalb breed 25.3, 27.3 and 35.4. In a 2nd trial of 12 hens over 42 days, records were made of wt. of yolk, white and shell of eggs, and of % transfer of vitamin A to yolk from the diet. Mean contents of vitamin A/g yolk were (i) 26.5, (ii) 26.7, (iii) 29.4, and transfer from the diet was 5% higher in (ii) and (iii) than in (i). In hens killed after 42 days, vitamin A contents of blood serum and liver were slightly higher, but not statistically significantly, with the supplemented diets. Supplementation was an advantage, with flavomycin superior to bacitracin; in particular, the proportion of eggs containing 500-700 IU vitamin A in the yolk was increased. ELC

## 25

[Vitamin A content of goose eggs in relation to diet.]

Jaitova, L.; Kaplocky, M.

*Zivocisna Vyroba* 25 (8) 589-596 (1980) [11 ref. Cs, ru, en, de] [Aysoka Skola Zemedelska, 662 65 Brno, Czechoslovakia]

4 groups of 20 geese (each consisting of 16 females and 4 males) received rations comprising 80% HU mixture (containing 19 500 IU vitamin A/kg) and 20% of 4 different grain mixtures (oats + barley, dried oats, dried maize, or dried oats + dried barley). Total daily intakes of vitamin A in the 4 group were resp. 3902, 4326, 4108, and 4042 IU/goose. The nature of vitamin A in the feeds (whether preformed or as carotene) is not stated. The geese also obtained some carotene (not measured) from access to grass runs. During the 5 months of lay (Feb.-June), 10-egg samples were taken monthly from each group. Data on vitamin A content of egg yolks are tabulated for each group, monthly and overall. In all groups, vitamin A contents increased progressively to a max. in May, and then decreased in June. Overall mean values were resp.: 3.59, 3.93, 4.97 and 3.17 IU/g yolk; and 662, 716, 904 and 584 IU/100 g yolk DM. SKK

## 26

The deposition of synthetic oxycarotenoids in egg yolks.

Karunajeewa, H.

*World's Poultry Science Journal* 36 (4) 219-226 (1980) [10 ref. En, de, ru] [Dep. of Agric. Anim. Res. Inst., Werribee, Victoria, 3030 Australia]

The relative efficiencies with which synthetic oxycarotenoids are deposited in egg yolks were examined in 3 experiments using either White Leghorn  $\times$  Australorp (W  $\times$  A) or White Leghorn (WL) hens. The oxycarotenoids measured were  $\beta$ -apo-8'-carotenoic acid ethyl ester (CAEE), canthaxanthin (CHX) and citranaxanthin (CTX). The effect of time and duration of administration of CAEE on its utilization was also measured. W  $\times$  A hens, aged 36 wk, deposited 30-46, 13-17 and 4.4-4.9% of the intake of CAEE, CHX and CTX, resp. in their egg yolks. The comparable values for W  $\times$  A hens aged 53 wk were 26-35, 17-18 and 3.2-

3.3%, resp. WL hens aged 32 wk deposited 49-50 and 13-15% of the intake of CAEE and CHX, resp. The deposition of CAEE tended to increase when it was given for 20 days rather than 10 days and when given daily at 15.00 h rather than 08.30 h. AS

## 27

[Comparative studies on physical and chemical properties of avian eggs. II. Polyacrylamide gradient gel disc electrophoretograms of chicken, quail, duck, muscovy duck, golden pheasant, and silver pheasant egg yolks.]

Tanabe, M.; Ogawa, N.

*Japanese Poultry Science [Nihon Kakin Gakkai-shi]* 16 (6) 337-343 (1979) [9 ref. Ja, en] [Dep. of Human Nutr. & Food Sci., Gifu Women's Coll., Taromaru, Gifu 501-25, Japan]

Polyacrylamide gradient gel (4.75 and 10%) disc electrophoretograms of egg yolk proteins of Rhode Island Red, Barred Plymouth Rock, White Leghorn and Tötenko chickens, Japanese quail, Khaki Campbell, Pekin and Naki ducks, Muscovy ducks, golden pheasant and silver pheasant were studied. 24 bands in the 10% gel and 2 bands in the 4.75% gel were observed. The highest density bands were observed in the sediment fraction after ultracentrifugation at 105 400  $\times$  9n for 20 h in all the species studied. Bands 1-22 were observed in the supernatant fraction. Band 8 was the densest in the supernatant fraction; this fraction of chicken eggs migrated faster than the corresponding band of duck, quail, Muscovy duck and pheasant eggs. Species differences in density in bands 10-16 were observed. Bands 20-22 were observed in chickens and quail, but not in ducks, Muscovy ducks or pheasants. [See preceding abstr. for part I. and following abstr. for part III.] AS

## 28

[Comparative studies on physical and chemical properties of avian eggs. IV. Horizontal polyacrylamide gradient gel electrophoretograms of chicken (*Gallus domesticus*), quail (*Coturnix coturnix japonica*), golden pheasant (*Chrysolophus pictus*), silver pheasant (*Gennaeus nycthemerus*), duck (*Anas platyrhynchos domestica*), muscovy duck (*Cairina moschata*) and pigeon (*Columba livia*) egg yolk.]

Tanabe, H.; Ogawa, N.

*Japanese Poultry Science [Nihon Kakin Gakkai-shi]* 17 (3) 109-115 (1980) [7 ref. Ja, en] [Dep. of Human Nutr., & Food Sci., Gifu Women's Coll., Taromaru, Gifu 501-25, Japan]

Horizontal polyacrylamide gel electrophoretograms (using step gradient gel of 8, 4 and 10% acrylamide concn.) of yolk proteins of the title spp. were studied. 10 bands were observed on 10% gel. Electrophoretic patterns differed between spp.; patterns of pigeon egg yolk proteins differed considerably from those of the other species. Genetic aspects of protein polymorphisms in egg yolk proteins are briefly discussed. [From En summ.] [See preceding abstr. for part III.] AJDW

## 29

[Effect of addition of Carophyll yellow and Carophyll red to diet of layers on egg yolk colour and stability of colour on refrigerator storage of eggs.]

Gawecki, K.; Potkanski, A.; Lipinska, H.

*Roczniki Akademii Rolniczej w Poznaniu* No. 94

(Zootechnika 23) 85-93 (1977) [13 ref. Pl, en, ru] [Inst. Zywienia Zwierzai i Gospodarki Paszowej, AR, Poznan, Poland]

Effect of adding synthetic carotenoids (Carophylls, Hoffman La-Roche) to layer diets on egg yolk colour was studied using 4 feeding groups of Leghorn layers with the following carotenoid content in diet: (i) Carophyll yellow 60 mg/kg; (ii) Carophyll red 60 mg/kg; (iii) natural carotenoids (from grass meal) 12.06 mg/kg; and (iv) control, 10.80 mg natural carotenoids/kg. Yolk colour was improved by Carophylls and the improved colour was stable to refrigerated storage. Carotenoid contents of egg yolks, as µg/g yolk and by Hoffman La-Roche colour fan rating, resp., were as follows: after 2 wk storage (i) 32.48, 10.4; (ii) 20.32, 11.0; (iii) 15.03, 6.1; (iv) 17.71, 5.5; and after 16 wk storage (i) 26.26, 10.1; (ii) 17.08, 10.6; (iii) 14.20, 5.9; (iv) 14.94, 5.5. [From En summ. and tables.]

DJH

## 30

Improvement of product attributes of mayonnaise by enzymic hydrolysis of egg yolk with phospholipase

A<sub>2</sub>

Dutilh, C. E.; Groger, W.

*Journal of the Science of Food and Agriculture* 32 (5) 451-458 (1981) [7 ref. En] [Unilever Res., PO Box 114, 3130 AC, Vlaardingen, Netherlands]

Egg yolk fermented with pancreatic phospholipase A<sub>2</sub> has been shown to be a more potent emulsifier for mayonnaise than untreated egg yolk. The mayonnaise withstood heating at 100°C for 30 min without the emulsion breaking. The treatment also effected a considerable thickening of the product. Animal feeding trials with lysolecithin and fermented egg yolk suggested that the enzymic hydrolysis does not pose any toxicological hazards. AS

## 31

[Separation of phospholipids from various sources. Comparison of HPLC and column chromatography.]

Filesi, C.; Serlupi Crescenzi, G.; Stazi, M. A.

*Rivista della Societa Italiana di Scienza dell'Alimentazione* 9 (6) 415-418 (1980) [3 ref. It, en] [Lab. degli Alimenti, Istituto Superiore di Sanita, Rome, Italy]

Studies were conducted on separation of phospholipid mixtures, extracted from egg yolk, soy lecithin or Toprina (a yeast biomass product), by (i) HPLC on a LiChrosorb Si-60 (7 µm) column or by (ii) preparative column chromatography on a silica gel 60 column. An n-hexane/isopropanol (6:8) to n-hexane/isopropanol/water (6:8:1.4) gradient was used. Phospholipids were detected in the eluate by UV spectrometry at 206 nm. Chromatograms are illustrated. Separation of phospholipids by both methods was good, although results differed; in some cases, separation of minor peaks by the 2 methods was complementary. Recovery of phospholipids by (ii) was 94.4% for soy lecithin, 93.5% for egg yolk, 72.6% for Toprina. AJDW

## 32

Intermediate-moisture frozen foods.

Kahn, M. L.; Eapen, K. E. (Rich Products Corp.)

*United States Patent* 4 244 976 (1981) [En]

A microbiologically stable intermediate moisture sugared egg yolk composition to be used in foods contains egg yolks, dextrose plus fructose, water, and stabilizer. This product is soft and non-crystalline at freezer temp. An example of these products comprises 8.38 parts dextrose, 30.26 parts fructose-dextrose syrup, 60.52 parts egg yolk, and 0.84 parts stabilizer. Other such foods are oil-in-water emulsion cream type products, such as butter creams, whipped creams, non-dairy creamers, flour based foods, soup and beverage concentrates, etc. RAW

## 33

A note on egg yolk cholesterol content in various avian species.

Chand, D.

*India n Poultry Gazette* 64 (3) 97-100 (1980) [8 ref. En] [Dep. of Anim. Production Physiol., Haryana Agric. Univ., Hissar-125 004, India]

The bird species studied, in increasing order of egg yolk cholesterol concn. (mg/g yolk) were: White Leghorn chicken (20.61), Japanese quail (21.78), turkey (22.84), duck (26.23) and pigeon (34.28). The differences in cholesterol content of egg yolk of chicken, quail and turkey were not significant; nor were differences between values for duck and turkey egg yolks. Pigeon egg yolk had significantly higher cholesterol concn. than that of the other species studied. CFTRI

## 34

Differences between α- and β-lipopitellin from hen egg yolk.

Kurisaki, J.; Yamauchi, K.; Isshiki, H.; Ogiwara, S.

*Agricultural and Biological Chemistry* 45 (3) 699-704 (1981) [24 ref. En] [Dep. of Agric. Chem., Univ. of Tokyo Bunkyo-ku, Tokyo 113, Japan]

Differences between α- and β-lipopitellin were examined, especially in regard to the polypeptide and carbohydrate composition of apolipoprotein. Both lipoproteins were composed of at least 8 polypeptides with similar mol. wt. ranging from 35 000 to 140 000 daltons. Polypeptides with 110 000 daltons were common major constituents. The close similarity of component polypeptides in the 2 lipoproteins was also assumed from similar amino acid compositions and the identical immunological properties of the 2 lipoproteins. However, some notable differences were found in the composition of the polypeptides. α-Lipopitellin contained much more polypeptide with 85 000 daltons than β-lipopitellin. Both apolipopitellins were found to be glycoprotein containing mannose, galactose, glucosamine and sialic acid. The sialic acid in α-lipopitellin exceeded that in β-lipopitellin by 6 ×, though only slight differences were found in the content of neutral and amino sugars. The relatively acidic nature of α-lipopitellin compared with β-lipopitellin is attributed not only to the relative predominance in protein phosphorus but also to the predominance in the sialic acid. AS

## 35

[Effect of diet fed to hens on the sterol composition of egg yolk.]

Lhuguenot, J. C.; Colas, B.; Sauveur, B.; Bertheau, D.  
*Annales de Zootechnie* 29 (4) 409-420 (1980) [24 ref.  
 Fr. en] [Ecole Nat. Supérieure de Biol. Appliquée à la  
 Nutr. & à l'Alimentation, Campus Univ., 21100 Dijon,  
 France]

Groups of Warren ISA and Shaver Starcross laying hens were used in feeding trials conducted to evaluate effects of diets with (i) 17% soybean meal, (ii) 12% soybean meal + 10% rapeseed meal or (iii) 11% soybean meal + 6% lucerne protein on the sterol composition of the egg yolk. Tables and chromatograms of results are given. Differences in sterol contents of the diets used were relatively small. In general, the diets had relatively little effect on the sterol contents of the eggs; the cholesterol contents of eggs laid by Warren hens fed (ii) were lower than those of eggs laid by Warren hens fed (i), and the  $\beta$ -sitosterol concn. in eggs laid by Warren hens was higher on diet (iii) than on diet (i). In general, Warren hens laid eggs with a higher concn. of sterols (other than cholesterol) than Shaver Starcross hens. AJDW

## 36

High-performance liquid chromatographic analysis of egg yolk phospholipids.

Hanson, V. L.; Park, J. Y.; Osborn, T. W.; Kiral, R. M.  
*Journal of Chromatography* 205 (2) 393-400 (1981)  
 [11 ref. En] [Pharmaceutical Res. Dep., American  
 McGraw, Irvine, California 92714, USA]

A rapid and efficient method for the separation of egg yolk phospholipids by normal-phase HPLC has been developed. The separation is accomplished on an Ultrasil-NH<sub>2</sub> column using hexane, isopropanol, methanol and water mixtures with direct UV detection at 206 nm. Phospholipids from a methanol extract of fresh lyophilized egg yolks were analysed providing complete separation of (in order of elution) neutral lipids, phosphatidylcholine, sphingomyelin, lysophosphatidylcholine and phosphatidylethanolamine. Identification of eluting species was accomplished by comparative retention times of standard samples and by TLC analyses of collected fractions. Furthermore, a mixture of naturally occurring phospholipid standards from bovine and egg sources has been separated by this method. In addition to separating the individual classes of phospholipids, in some instances, separation of molecular species within a class was achieved as in the case of cerebrosides, sphingomyelin and partially with phosphatidylethanolamine. AS



# POULTRY

1

[Study of some variables in the continuous immersion cooling of poultry carcasses.] [Thesis: Estudo de algumas variaveis no resfriamento continuo por imersao de frango. Pt] Neves Filho, L. C.

*Informativo Anual, Faculdade de Engenharia de Alimentos e Agricola, Universidad Estadual de Campinas* No. 7, 30-32 (1979) [Pt. en]

This is a summary of a 1978 thesis from this University. A mathematical model was developed to simulate continuous cooling of poultry carcasses by passing them through 2 tanks in series, using a worm conveyor. Data from the model compared well with results from practical slaughterhouse experiments. The model enabled the major processing parameters (e.g. heat conductivity of the carcass, coeff. of heat transfer between carcass and cooling water) to be determined. In further practical tests, ClO<sub>2</sub> proved satisfactory in reducing the bacterial count of the water used to cool the carcasses. [From En summ.] KME

2

Effects of ozone treatment on microflora of poultry meat.

Yang, P. P. W.; Chen, T. C.

*Journal of Food Processing and Preservation* 3 (2) 177-185 (1979) [13 ref. En] [Poultry Sci. Dep., Mississippi Agric. & Forestry Exp. Sta., Mississippi State Univ. Mississippi 39762, USA]

Ozone was produced using a Welsbach ozonator and measured by an iodometric titration method. Microbiological characteristics of ozone treated and air treated control samples were studied. Ozone treated broiler parts had consistently lower microbial counts than the control parts during the entire refrigerated observation period. Using log total microbial counts of 7.0 cm<sup>2</sup> as a spoilage criterion, broiler parts treated with ozone had extended shelf-lives for 2.4 days. Ozone treated samples contained about 52.7% Gram-positive cocci, while the air treated control samples had 39.6% Gram-positive cocci. Air treated control samples had 22.4% Gram-negative rods while the ozone treated samples had only 12.7% Gram-negative rods. Studies using microflora from spoiled poultry meat have also demonstrated that ozone treatment preferentially destroyed Gram-negative rod-type organisms. AS

3

Meat, fish and poultry processing wastes. [Review] DiNovo, S. T.; Litchfield, J. H.

*Journal, Water Pollution Control Federation* 51 (6) 1315-1322 (1979) [62 ref. En] [Battelle Columbus Lab., Columbus, Ohio, USA]

Literature on the treatment systems for dealing with industrial wastes from various types of plants processing meat, fish and poultry are reviewed. AL

4

[Correlation between structural-mechanical properties and mincing parameters of 'Kroshka' canned meat product for babies.]

Kosoi, V. D.

*Myasnaya Industriya SSSR* No. 12, 7-10 (1979) [7 ref. Ru] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

Studies were conducted to determine the optimum parameters for mincing of poultry meat in the manufacture of 'Kroshka', a canned homogenized poultry meat product with a fluid consistency, thickened with starch and containing 0.3% NaCl. The relation between the characteristics of the homogenized product (limiting shear strength, water binding capacity) and homogenization parameters (number of homogenizations, and the stator/rotor gap width of the colloid mill) is discussed. It is concluded that optimum properties are achieved by 2 milling operations at a gap width of 0.35 mm, 3 milling operations at a gap width of 0.5 mm and 4 milling operations at a gap width of 0.7 mm. STI

5

Shackle unloading device.

Dodd, N. T.

*United States Patent* 4 195 386 (1980) [En]

A shackle unloading device is described for unloading poultry supported in shackles by their hocks, where the shackles are adapted to be unloaded by lifting upwards on the legs of the poultry adjacent their hocks and includes a conveyor for moving the shackles successively along a predetermined conveying path. Unloader bars lift upwards on the poultry hocks to release them from the shackles and thus unload the shackles. SP

6

[Present situation and prospects for poultry meat production in Poland.]

Szeliga, E. i.; Kruszynski, J.; Prominski, W.

*Hydinarsky Priemysel* 22 (1/2) 14-23 (1980) [Sk] [Poldrob, Poznan, Poland]

Poultry meat production in the yr 1970-1990 is discussed, including information on raw material as well as the equipment used. Equipment for processing water fowl of Polish production is described. The range of poultry meat products manufactured and utilization of by-products is also dealt with. STI

7

[Technological, physico-chemical and hygienic properties of mechanically boned poultry meat.]

Nestorov, N.; Mitkov, S.; Beev, K.; Davidova, I.;

Nikolova, R.; Nikolova, T.

*Hydinarsky Priemysel* 22 (1/2) 44-51 (1980) [20 ref. Sk] [Inst. Masoveho Priemyslu, Sofia, Bulgaria]

It was established that the yield of mechanically boned poultry meat was 15-20% higher than by manual deboning. The machine used (Bibun) was able to bone whole chickens as well as their individual parts (necks, backs and wings). Machine boning did not affect adversely the water binding capacity of meat nor its chemical composition or nutritive value. The deboned meat found a wide range of applications. STI

## 8

[Main development trends in the poultry industry in Hungary.]

Szesten, G.

*Hydinarsky Priemysel* 22 (1/2) 31-44 (1980) [Sk]

Characteristics of poultry processing equipment used in Hungary are discussed. Automation and mechanization of poultry processing is dealt with and the present situation in poultry products manufacture is presented as well as future developments. STI

## 9

[Current situation in poultry meat production in Bulgaria.]

Nestorov, D.; Mitkov, S.; Nikolova, T.; Nikoiova, R.; Davidova, I.; Beev, K.; Bakalinov, S.; Khristov, G.; Bakalivanova, T.

*Hydinarsky Priemysel* 22 (1/2) 24-30 (1980) [Sk] [Inst. Masoveho Priemyslu, Sofia, Bulgaria]

The unexpected development of the poultry industry in Bulgaria is discussed. Annual per capita poultry meat consumption in Bulgaria was 12.5 kg in 1978. Poultry is processed into portioned meat (31.76%), salamis (39.2%), pastes (4%), special poultry products (2.8%), cooked and smoked chicks (4.5%) and canned products (17.74%). Recipes for 2 kinds of poultry meat sausages are presented. 12 kinds of canned products are manufactured. STI

## 10

[Application of coulometric titrations for determination of chlorides and proteins in poultry meat products.]

Lukacka, J.; Rybarova, B.

*Hydinarsky Priemysel* 21 (6/8) 246-252 (1979) [7 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

The detn. of chlorides and proteins in poultry meat products were carried out with the chloride coulometric titrator CMT-10 (Radiometer) and the universal coulometric titrator OH-404 (Radelkis) working at constant current. Comparison of the experimental results with those obtained by other methods such as detn. of proteins by the Kjeldahl method or by the Mertz method using the Micro Rapid N (Heraeus) analyser showed that both coulometric titrators OH-404 and CMT-10 significantly improved the productivity of laboratory work. STI

## 11

[Commercial poultry meat processing in Czechoslovakia.]

Kavela, A.

*Hydinarsky Priemysel* 22 (1/2) 59-67 (1980) [Cs] Jihomoravske Drubezarske Zavody, Velke Pavlovice, Czechoslovakia

Poultry meat processing includes > 76% chickens, 4% turkeys, 7.7% ducks and 3% geese. The technology of poultry processing is discussed and also the manufacture of various poultry products. STI

## 12

Consumer evaluation of guineas.

Hughes, B. L.

*Poultry Science* 59 (3) 543-544 (1980) [3 ref. En]

[Poultry Sci. Dep., Clemson Univ., Clemson, S. Carolina 29631, USA]

A study designed to evaluate guinea fowl (keet) as a consumer product was conducted with >40 families participating. Participants were requested to prepare frozen keets by the method of their choice and, after consuming the prepared product, to complete and return an evaluation form. The majority of the participants either baked or roasted the keets. The meat was considered to be moderate to mild in flavour, tender to very tender, and juicy to slightly juicy. No participant said he disliked keet as a poultry product. Most people said that keet was at least equal to chicken and that they would buy them occasionally, especially if they were available at an economical price. AS

## 13

[The psychrotrophic flora of poultry carcasses. IV. Qualitative and quantitative variation in turkeys in relation to sampling technique (swabbing or comminution of skin).]

Laheliee, C.; Colin, P.; Bennejean, G.; Catsaras, M.

*Revue de Medecine Veterinaire* 130 (12) 1613-1621 (1979) [12 ref. Fr. en. de. es] [Sta. Exp. d'Aviculture, 22440 Ploufragan, France]

Comparative studies were conducted on the psychrotrophic flora of 15 turkey carcasses, using samples collected by (i) swabbing of the skin or (ii) comminution of skin pieces. Samples were taken immediately after chilling of the carcasses and after storage for 10 days at 3°C. Tables of data are given for the bacterial flora and counts in the samples studied. Mean values and ranges for psychrotroph counts immediately after chilling were: (i)  $1.6 \times 10^4/g$  and  $0.7 \times 10^3$ - $3.4 \times 10^4/g$ ; and (ii)  $3.1 \times 10^5/g$  and  $0.1 \times 10^5$ - $507 \times 10^5/g$ . Corresponding values after 10 days storage were: (i)  $1.7 \times 10^5/g$  and  $0.2 \times 10^5$ - $139.0 \times 10^5/g$ , and (ii)  $3.5 \times 10^7/g$  and  $0.1 \times 10^7$ - $896 \times 10^7/g$ . A total of 565 isolates were identified, including *Pseudomonas*, *Acinetobacter*, *Flavobacterium*, *Aeromonas* and *Corynebacterium* spp., yeasts, Enterobacteriaceae and Micrococcaceae. In general, Micrococcaceae, *Flavobacterium* and

*Corynebacterium* spp. predominated before storage; *Pseudomonas* spp. predominated after storage. The % composition of the microflora differed between samples collected by the 2 methods. (i) tending to give higher counts of yeasts, Micrococcaceae and *Corynebacterium* spp. but lower counts of *Pseudomonas* spp. than (ii). AJDW

## 14

**Bag, plastic (produce and poultry).**

United States of America, General Services Administration, Federal Supply Service  
*Federal Specification PPP-B-1089C*, 5pp. (1978) [En]  
 [Washington, DC 20406 USA]

This specification supersedes PPP-B-1089B:1972, and covers requirements for plastics bags for the packaging of food. The bags shall be either perforated (flat or square) or nonperforated (flat or square) of various dimensions. AL

## 15

**[Nutritional/physiological significance of eggs and poultry meat.]** Die ernährungsphysiologische Bedeutung von Eiern und Geflügelfleisch.

Proll, J.

*Ernährungsforschung* 25 (1) 20-24 (1980) [De]  
 [Zentralinst. für Ernährung, Potsdam-Rehbrücke,  
 German Democratic Republic]

Tables of data are given for the composition (protein, fat, carbohydrate, vitamins, cholesterol, minerals and moisture) of eggs and poultry meat, and for consumption of eggs and poultry meat in the German Democratic Republic over the period 1955-1977. It is concluded that eggs and poultry meat are high quality, easily digestible and assimilable foods, and are especially valuable sources of protein. Increased consumption of broiler and turkey meat in place of fat-rich meats is recommended. Per capita consumption of eggs should not exceed the present level, because of the relatively high concn. of cholesterol. IN

## 16

**[Rationalized packaging of processed poultry.]**

Vltavsky, J.

*Manipulace Skladovani Baleni* 8 (11) 336-337 (1979)  
 [Cs] [Drubezarsky Prumysl, Generalni Reditelstvi,  
 Prague, Czechoslovakia]

A newly developed packaging machine for use with polyethylene bags is described. The machine performs 4 major operations: the bags are opened by compressed air; the poultry is fed automatically into the bags; the bags are closed by means of Al clips; and the rest of the bag is cut off. When tested under practical conditions, the machine gave very good results. STI

## 17

**[Present situation in the poultry industry and future development of poultry processing science and techniques in the USSR.]**

Lobzov, K. L.

*Hydinarsky Priemysel* 22 (1/2) 6-13 (1980) [Sk] [NPO Kompleks, Kryukovo, Moscow, USSR]

Organization of the poultry industry in the USSR is discussed and the variety of products manufactured is dealt with. Hens and broilers are the main processed product (57%), with a lesser extent ducks (39%), turkeys (3%) and geese (1%). Rabbits are processed in large numbers at the poultry processing plants; average 25 000 t of rabbit meat has been produced yearly. The yearly increase in poultry meat processed amounted to 20% during the past 5 yr. Partridges are bred on a commercial basis and processed at poultry processing plants. STI

## 18

**[Interrelation between total body moisture content, growth rate and tritium exchange.]** Zu Beziehungen zwischen Gesamtkörperwasser, Wachstumsintensität und Tritiumtausch. [Review]

Strube, J.; Schülke, B.

*Archiv für Tierernährung* 30 (1/3) 147-152 (1980)  
 [16 ref. De] [Sektion Tierproduktion & Veterinärmed.,  
 Humboldt-Univ., DDR-104 Berlin]

Literature data for the relation between total body water content and body composition and between total body water content and tritiated water space of various animals, including geese, cattle and swine, are discussed. Residual tritium activity in tissues of animals after detn. of tritiated water space is also considered. These data are discussed in relation to prediction of body composition of slaughter animals on the basis of tritiated water space. AJDW

## 19

**[Concepts for up-to-date technological planning in a broiler chicken processing plant.]**

Szigeti, M.

*Baromfitenyesztes es Feldolgozas* 27 (2) 61-65 (1980)  
 [Hu] [Agrober Elelmiszeripari Tervező Iroda, Budapest,  
 Hungary]

When planning an up-to-date technology for a broiler chicken processing plant the following aspects should be considered: installation of automatic or semi-automatic equipment to reduce human labour; mechanical transportation of all products (conveyor belts, etc.); fulfilment of all hygienic requirements; and the production of high quality end-products, including aesthetic considerations. An up-to-date plant should be able to process 6000-9000 broiler chickens of 1.4 kg average body wt./h (plucking 6000-9000 and eviscerating 4000-5000/h). It should also be able to process 3000 turkeys of max. 3.5 kg body wt., 1500 turkeys of max. 10 kg body wt., 3000 ducks of max. 2.5 kg body wt., and 2000 geese of max. 3.5 kg body wt. ESK

## 20

**[Determination of myosin (purified using Sephadex G-100 column) in fresh and frozen duck meat.]**

Smoczkiewiczowa, A.; Nowotarska, G.; Wieladek, H.  
*Zeszyty Naukowe, Akademia Ekonomiczna w Poznaniu* Seria I, No. 73, 28-34 (1978) [9 ref. Pl, en, ru]

Myosin was isolated from unprocessed and frozen duck meat (frozen at -18°C and -45°C in liquid N) by the method of Smoller, using a chromatographic column packed with Sephadex G-100. Freezing caused changes in the composition of the meat. STI

21

**Poultry-associated foodborne disease - its occurrence, cost, sources and prevention.**

Todd, E. C. D.

*Journal of Food Protection* 43 (2) 129-139, 126 (1980)  
[143 ref. En][Food Directorate, Health & Welfare Canada, Ottawa, Ontario K1A 0L2, Canada]

Poultry-asssociated foodborne disease is reviewed, and data from the literature are presented graphically, to show the occurrence of poultry-associated human disease by country and aetiological organism, factors that contribute to outbreaks, economics of poultry-borne disease, sources of poultry contamination, prevalence of the most significant poultry-borne pathogen *Salmonella* on poultry from many countries, and methods of prevention of poultry-associated disease. DIH

22

**[Pigeon varieties for meat production.]**

Teremi, G.

*Baromfitenyesztes es Feldolgozas* 27 (2) 79-83 (1980)  
[Hu]

In Hungary, partly due to lack of suitable meat-producing pigeon var. and partly to lack of technical information, the pigeon meat yield in 1979 was 20% less than in previous yr. To improve this situation detailed information is given of 69 large pigeon var. suitable for meat production or producing hybrids giving good meat yield. ESK

23

**Poultry eviscerating method.**

Loth, K.; Loth, P.

*United States Patent* 4 208 764 (1980) [En]

Poultry is clamped in a belly-up position to a horizontal supporting plate and eviscerated by beginning from the rear and moving forwardly through the neck cavity. IFT

24

**[Poultry tenderization.]**

Nissin Flour Milling Co. Ltd.

*Japanese Examined Patent* 5 520 666 (1980) [Ja]

Living adult birds are injected with a solution containing papain and bromelain, after which they are killed and the meat immersed in hot water. IFT

25

**Marinated poultry product.**

Eberhardt, T. J.; Bibhuti, A. R.

*United States Patent* 4 206 241 (1980) [En]

A series of incisions are made within the breast and thigh meat of a fowl from which the skin has been removed, after which salt and lime juice are applied to the incisions and the fowl coated with a marinade. The fowl is then cooked at about 800°F for 8.5 to 10 min. IFT

26

**[Poultry meat technology in Yugoslavia and possibilities of its further development.]**

Trumic, Z.

*Tehnologija Mesa* 20 (7/8) 229-231 (1979) [Sh, en]  
[Jugoslavenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

The present level of technology of slaughter, dressing, cooling, freezing and packaging of poultry in Yugoslavia is discussed; possibilities of improvement are considered, together with the necessity of use of modern additives. The desirability of improvement of standards of hygiene is also discussed. STI

27

**[Process and equipment for simple and speedy plucking of poultry.]**

Orty, R.

*French Patent Application* 2 428 981 (1980) [Fr]

Enclosed apparatus is described, through which poultry carcasses are passed immediately after killing, for the operations of bleeding, sousing and/or scalding and mechanical plucking. Essentially the operations are carried out at constant temp., e.g. 52°C. W&Co

28

**[Method of preparation of fried, deep-frozen poultry.]**

Verfahren zur Herstellung von fritürtem, tiefgefrorenem Geflügelfleisch.

Barth, U.

*German Federal Republic Patent Application*  
2 841 942 (1980) [De]

Pieces of poultry meat freed from skin, bone and fat are tumbled in a container under vacuum. The agglutinous mass is seasoned and packed in large sausage skins in which it is cooked. The meat is then cut into chips of about 5 cm in length and 1 cm thick, covered in bread crumbs and deep-frozen. The chips are intended for supply to hotels and snack bars. W&Co

29

**[Hygienic aspects of poultry slaughter and dressing.]**

Nedeljkovic, L.

*Tehnologija Mesa* 20 (9) 261-263 (1979) [7 ref. Sh, en]  
[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Hygiene problems attributable to introduction of modern poultry husbandry and processing (slaughter, dressing, packaging, storage, marketing) methods are discussed. Mechanization of slaughter and dressing of poultry has led to neglect of public health aspects in some cases. Hygiene of poultry slaughter and dressing is discussed, with reference to likely points of contamination, and possibilities for improvement of hygiene in poultry slaughterhouses. STI

30

**Voluntary meat and poultry plant quality systems.****United States of America, Food Safety & Quality Service****Federal Register 45 (160, Aug. 15) 54311-54325 (1980)**  
[En][Washington, DC, USA]

The Food Safety & Quality Service will approve systems of plant quality control which will result in the preparation of meat and poultry products in conformity with the requirements of the Federal Meat and Poultry Inspection Acts. CAS

31

**Epidemic spread of *Salmonella hadar* in England and Wales.**Rowe, B.; Hall, M. L. M.; Ward, L. R.; Sa, J. D. H. de  
**British Medical Journal** 280 (6221) 1065-1066 (1980)  
[1 ref. En][Div. of Enteric Pathogens, Cent. Public

Health Lab., London NW9 5HT, UK]

Some statistics of outbreaks of *Salmonella hadar* food poisoning are presented. The number of strains identified has grown enormously since 1971 and vehicles of infection are commonly turkey, chicken or beef. Currently 35 phage types of *S. hadar* are recognized and it is the second commonest serotype isolated from cases of food poisoning in England and Wales. As turkeys are the main reservoir for this organism, it should be eradicated from the breeding stocks as quickly and economically as possible. LH

32

**[Considerations on the use of carotenoids in production of fish and poultry.]**

Ferrando, R.

**Medecine et Nutrition** 16 (3) 189-198 (1980)[37 ref. Fr, en][Lab. de Nutr. & d'Alimentation, Ecole Nat. Vet d'Alfort, 94704 Maisons-Alfort Cedex, France]

Criticism of the use of synthetic carotenoids as feed additives to improve the colour of fish and poultry products is discussed, with reference to claims that this leads to deception of consumers, and objections to use of synthetic food and feed additives. Aspects considered include: the toxicity of many 'natural' foods; consumer preference for attractively-coloured products; limitations of natural carotenoid preparations (unpredictable composition, instability, and possible presence of toxic constituents, or components adversely affecting colour); advantages of synthetic carotenoids (stability, and the potential for accurate and reproducible colouring); and the impracticability of analytical differentiation between natural and synthetic carotenoids. AJDW

33

**[Composition of fatty acids of hen and goose fat.]**

Kostenko, T. A.; Kozyarenko, T. A.; Zubkova, V. I.; Ganushevich, A. P.

**Izvestiya Vysshikh Uchebnykh Zavedenii,**  
**Pishchevaya Tekhnologiya** No. 2, 121-122 (1980) [Ru]  
[Kievskii Tekh. Inst. Pishchevoi Promyshlennosti, Kiev, USSR]

Gas chromatography was used to study the composition of fatty acids in hen and goose fat; spectrophotometry in UV zone was also used. Content of unsaturated fatty acids is higher in the 2 fats than in human milk; the values are close for polyunsaturated fatty acids, especially linoleic acid. The fats under study are biologically active and can be used as a fat constituent in making substitutes for human milk. STI

34

**[Improving the quality and nutritive value of various canned poultry meat products.]**

Pikul, J.; Kijowski, J.; Niewiarowicz, A.; Matyniak, J.; Sochacka, B.

**Gospodarka Miesna** 32 (3) 1, 24-27 (1980) [7 ref. Pl, en, ru]

The compositions of Frankfurter type sausages incorporating 61-67% poultry meat, 15-21% skin and subcutaneous fat, 9% pork chaps and 9% soy oil; of tomato, vegetable and leek sauces; and of poultry meat meat balls incorporating 0.2-1.0% 'Frimulsion' preparation are tabulated. Data include contents of moisture, protein, fat, NaCl, saturated and unsaturated fatty acids and vitamin E and pH. HBr

35

**Mechanical deboning of poultry.**

Helmer, W. D.; Small, R. E. (Campbell Soup Co.)

**United States Patent** 4 213 229 (1980) [En]

Method and apparatus for separating poultry meat from bone by centrifugal force are described. A poultry section is attached to a rotating member; the high-speed rotation of the member with controlled acceleration causes separation of meat from the bone. This dry method produces large chunks of meat, neatly and conveniently separated from the bone. An apparatus which separates meat from bone of a plurality of carcasses in semi-automatic fashion is also described. Poultry pieces, continuously attached to the apparatus by hand, are automatically deboned by centrifugal force and the meat recovered. AS

36

**Device for cutting off the neck meat of a fowl.**

Komatsu, S.; Kitajima, H. (Seigi Komatsu)

**United States Patent** 4 213 228 (1980) [En]

A device for cutting meat from the neck of a fowl is described in which the neck of the fowl is held on a support equipped with a suction hole for attracting the meat, and the meat is cut by a blade which moves to face the suction holes of the support. The straight cutting blade is allowed to reciprocate along the length of the suction hole. AS

37

**Machine for severing poultry into predetermined portions.**

Duncan, W. D.; Duncan, C. L.

**United States Patent** 4 214 345 (1980) [En]

A high speed rotary cutting apparatus is described for automatically severing eviscerated poultry carcasses into predetermined portions; jets of cold water are directed against the sides of the cutters during the cutting operation to increase their efficiency. IFT

38

**Meat stripping machine for fowl.**

Volk, A. J.; Groh, R.

**United States Patent 4 216 565 (1980) [En]**

Meat stripping apparatus for fowl is described, employing a gripping means and a number of radially movable stripping knives controlled by a cam unit. IFT

39

**Poultry picking machine.**

Crawford, D. R.; McDonald, D. M. (Simon-Johnson Inc.)

**United States Patent 4 217 678 (1980) [En]**

Poultry plucking apparatus employs 2 banks of pluckers and means for rocking the banks to adjust the shape of the plucking zone. IFT

40

**Skinning machine.**

Poss, W. (Poss Design Ltd.)

**United States Patent 4 215 450 (1980) [En]**

In a skinning machine, intended primarily for deskinning poultry pieces, a cylindrical feed screw in a cylindrical passage forms an annular feed passage. The passage increases in flow capacity from a hopper at its entrance, where the pieces are received, to a skin removal station, and then decreases in flow capacity to its end. Skin removal means include pairs of rollers mounted around the passage at the skin removal station, each roller having a radially protruding rib that extends near the surface of the other roller so as to grip the skin and strip it from the pieces. The rollers have a peripheral speed greater than the feed screw and part of the separated skin is passed between them out of a 1st exit. The machine includes a cylindrical knife edge barrier at the exit from the skin removal station that engages the pieces moving axially towards the piece exit and presses them back into contact with the skin removal rollers before they leave the station. A 2nd exit for the majority of the skin is formed by a gap between this barrier and the skin removal means. A gear train is provided to drive the slower rotating feed screw and the faster rotating skin removal rollers from the same motor. AS

41

**Effects of flake-cutting, seasoning, and structured protein fiber on mechanically deboned poultry meat.**

Lyon, C. E.

**Poultry Science 59 (5) 1031-1035 (1980) [11 ref. En]**  
[Anim. Products Development Res. Unit, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30604, USA]

8 types of patties were prepared containing mechanically deboned poultry meat. Meat alone, meat + seasoning, meat + structured protein fibre, and meat + both seasoning and structured protein fibre were used; meat for 4 of the products was flake-cut prior to mixing with the other ingredients, whereas the remaining 4 products were mixed without flake-cutting

the meat. The products were evaluated objectively for moisture and fat, water-holding capacity, % moisture retained, cooked yield, retention of water and fat, and textural properties. % of moisture retained was significantly higher in patties made with flake-cut than with mixed meat, but it was the only variable that was significantly different between flake-cut and mixed products. Analysis of the pooled data showed significant differences due to ingredients. The addition of 1% seasoning (NaCl, pepper, sage, coriander, and glucose) significantly increased % of moisture retained and cooked yield and significantly decreased hardness and areas under the compression curves. The addition of 15% structured protein fibre to the meat significantly increased springiness, cohesiveness, and chewiness. The combination of seasoning and structured protein fibre significantly increased cooked yield, retention of water and fat, and % moisture retained. AS

42

**Composition of lipids from mechanically deboned poultry meats and their composite tissues.**

Jantawat, P.; Dawson, L. E.

**Poultry Science 59 (5) 1043-1052 (1980) [18 ref. En]**  
[Michigan State Univ., E. Lansing, Michigan 48824, USA]

Lipids from mechanically deboned light and dark chicken and turkey meats (MDCM and MDTM), hand-deboned light and dark chicken and turkey meat (HDCM and HDTM), their corresponding bone residues, and skin tissues were analysed for total cholesterol, phospholipids (total and fractions), and fatty acid distribution profiles (polar and nonpolar fractions). Small differences were found in the fatty acid composition of neutral lipids from various tissue samples. The fatty acid components of the phospholipids from MDCM and MDTM more closely resemble the fatty acids of their corresponding bone or hand deboned meat phospholipids than those of skin phospholipids. The cholesterol content of MDCM and MDTM lipids resembled more closely that of skin lipids or bone lipids than that of muscle lipids. AS

43

**Meat and mass transfer in chilling poultry. (In 'Food process engineering 1979' [see FSTA (1981) 13 4E167])**  
[Lecture]

Veerkamp, C.

Abstr. no. 1.2.6 (1979) [En] [Spelderholt Inst. for Poultry Res., Min. of Agric. &amp; Fisheries, 7361 DA Beekbergen, Netherlands]

Poultry carcasses are cooled by either immersion in cold water or air cooling. Heat removal during immersion chilling could not be described by simple geometrical models and an empirical equation was developed. Water uptake during chilling depended on several parameters, friction between the carcasses being the most important. Heat removal during air cooling is due to both heat transfer from carcasses to the air and evaporation of water from the product, the latter being a major factor in achieving a short cooling time. Evaporation and heat transfer at the surface can be described mathematically. Loss of water by evaporation is normally made up by transport from inside the carcass, but can be compensated by wetting

44

**Factors affecting the adhesion of coating to poultry skin.**

Suderman, D. R.

*Dissertation Abstracts International, B* 41 (1) 122-123; Order no. 80-15277, 174pp. (1980) [En] [Kansas State Univ., Manhattan, Kansas 66506, USA]

Scanning electron micrographs of poultry skin indicated that adhesion of batter and breadings to poultry skin could be affected by skin ultrastructure and that improved skin adhesion might result from removal of the cuticle. A mechanical method was devised to measure breading adhesion in food products, which takes only 1 min to perform; results showed breading loss increased with increased shake time. Gelatin and egg albumen were the most effective proteins in improving adhesion ( $P < 0.05$ ). Sodium carboxymethyl cellulose was significantly ( $P < 0.001$ ) better at improving adhesion than other gums. Increased gum and protein levels did not significantly ( $P < 0.05$ ) affect adhesion. Presence and growth of bacteria on poultry skin during extended storage did not significantly affect breadcrumb loss or drumstick vol. loss ( $P < 0.05$ ). Storage time significantly ( $P < 0.05$ ) affected breading pick up and baking losses. Vol. and baking loss were reduced and product tenderness was improved significantly ( $P < 0.05$ ) by coating poultry pieces with a breading mix. As poultry pre-dip was changed from water, to milk, to evaporated milk, vol. and baking losses were reduced. Breading particle size affected vol. loss only. Breading mix containing soy protein improved meat tenderness and decreased baking loss significantly ( $P < 0.05$ ). Freezing drumsticks prior to breading did not significantly change coating compared with fresh-drumsticks. SP

45

**A scrape-sampling device for the microbiological examination of poultry carcasses.**

Adams, B. W.; Mead, G. C.; Pennington, D. E.

*British Poultry Science* 21 (1) 71-75 (1980) [7 ref. En] [Agric. Res. Council, Food Res. Inst., Colney Lane, Norwich NR4 7UA, UK]

A device was developed to permit standardization of the scrape-sampling method and to facilitate sampling of different parts of the poultry carcass. Scrape sampling of turkey carcasses from 5 different stages of processing yielded only slightly lower counts of microorganisms than maceration of excised skin samples in the Colworth Stomacher, thus indicating that the scrape method removed a large proportion of the organisms present on the skin. Only at 2 stages of processing were the differences in count significant ( $P < 0.05$ ), i.e. after plucking and after spray washing. The reasons for this are not known. AS

46

[Experience in and results of goose production from the viewpoint of improvement in carcass quality in the Leipzig district.] Erfahrungen und Ergebnisse der Gänseproduktion unter dem Gesichtspunkt der ständigen Verbesserung der Schlachtkörperqualität im Bezirk Leipzig.

Gey, K.

*Tierzucht* 33 (11) 524-526 (1979) [De] [VEB Geflügelwirtschaft Bezirk Leipzig, Sitz Mutzschen, Leipzig, German Democratic Republic]

Developments in breeding, rearing and slaughter of young geese are discussed, with reference to effects on carcass yield and quality. Tables of data are given showing effects of slaughter age (56, 63, 72 or 108 days) on % breast meat, % thigh meat, % total high-value cuts, slaughter yield, residual feather score after plucking, cooking loss and water-binding capacity, effects of mixed-sex slaughter on the % Class I carcasses, and effects of transport loose or in cages on losses during transport, slaughter yield, and % Class I carcasses. The results show that yield of breast meat and of total high-value cuts increased to a max. at 72 days of age, declining subsequently. Slaughter yield was max. at 63 days of age. Cooking loss was min. at 72 days of age. Separate rearing and slaughter of males and females was advantageous; for max. % Class I carcasses, males should be slaughtered at 63 and females at 59 days of age. Transport in cages gives lower losses, higher carcass yield and higher % Class I carcasses than loose transport. AJDW

47

**Benzpyrene in smoked poultry.**

Raja, K. C. M.; Mahendrakar, N. S.; Moorjani, M. N.

*Journal of Food Science and Technology, India* 17 (3) 156 (1980) [5 ref. En] [Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Attempts were made to reduce the benzpyrene content of smoked poultry by controlling the smoking time, and reducing the combustion time by moistening the wood shavings. It was found that restricted air supply for 3-4 h and moistening the wood shavings lowered benzpyrene content to 0.0-0.002 p.p.m., compared to 0.002-0.021 and 0.032-0.063 in 3-4 h and 7-8 h smoking resp. with free air supply and dry wood shavings. CFTRI

48

**Rapeseed meal and its use in poultry diets. [Review]**

Fenwick, G. R.; Curtis, R. F.

*Animal Feed Science and Technology* 5 (4) 255-298 (1980) [many ref. En] [ARC, Food Res. Inst., Colney Lane, Norwich, NR4 7UA, UK]

Literature data on the use of rapeseed, rapeseed meal, and rapeseed gums in diets for poultry are discussed, with reference to: effects on growth rate and carcass quality; 'fishy' taint in eggs, and in the flesh of broilers fed rapeseed and its products; and problems attributable to glucosinolates and goitrogens in rapeseed meal. AJDW

49

[Organochlorine hydrocarbon content of the fat of domestic birds. VII. DDT, DDE, DDD and HCH in depot fat of fattened geese of different breeds and ages.]

Smoczyński, S.; Faruga, A.; Markiewicz, K.; Ulatowska, K.

*Zeszyty Naukowe Akademii Rolniczo Technicznej w Olsztynie, Technologia Zywosci* No. 15, 203-210 (1979) [15 ref. Pl, ru, en] [Inst. Fizyki & Chemii Zywosci, AR-T, Olsztyn, Poland]

Groups of geese aged 2, 3, and 4 yr, of Italian White, Pomorska, Zatorska or Lubelska (Lublin var. of Pomorska) breeds were kept on pasture to the end of lay. 6 geese were then selected at random from each age × breed combination, fed for 14 days on barley only, and slaughtered after a 12 h fast. Perinephric, gizzard, and subcutaneous (neck) fats were examined by GLC for DDT, DDE, DDD and HCH contents. Mean values are tabulated for all variants, as well as results of statistical analysis of differences. Trends of effects of breed and age on pesticide residue contents are discussed. The Italian White breed tended to have higher chlorinated hydrocarbon concn. in its reserve fat than other breeds. [See FSTA (1980) 12 6S961 for part VI.] SKK

50

[Fatty acid composition of depot fats in geese of different breeds and varieties.]

Markiewicz, K.; Faruga, A.; Smoczyński, S.; Kaczynska, Z.; Puchajda, H.

*Zeszyty Naukowe Akademii Rolniczo Technicznej w Olsztynie, Technologia Zywosci* No. 15, 179-187 (1979) [17 ref. Pl, ru, en] [Inst. Fizyki & Chemii Zywosci, AR-T, Olsztyn, Poland]

Groups of goslings consisting of 100 White Italian, 120 Zatorska, and 100 Pomorska breeds, and 61 and 38 resp. of Lublin and Suwalski var. of the Pomorska breed were reared and fed alike to 24 wk of age. 10 birds were then selected at random from each of the groups and slaughtered after a 12 h fast. Samples of subcutaneous, gizzard and intestinal fats were analysed by GLC for component fatty acids (FA). Mean values with s. d. are tabulated for the various fat types in each breed or var. for 9 individual FA and total saturated and total unsaturated FA. No significant differences in FA content or composition were found between the fat types: the breeds and var. examined showed very similar FA contents in depot fats. SKK

51

[Influence of milk proteins on the amino acid composition of canned poultry meat.] [Lecture]

Gonotskii, V. A.; Seredenko, L. D.; Abramova, L. A. *Proceedings of the European Meeting of Meat Research Workers* No. 25, 12.10.925-12.10.930 (1979) [8 ref. Ru, en, de, fr] [Nauchno-proizvodstvennoe Ob'edinenie Ptitsopererabatyvayushchei i Kleezhelatinovoi Promyshlennosti "Kompleks", Moscow, USSR]

New kinds of canned poultry meat of high nutritional value, made with milk proteins, were developed. Use of milk concentrates in canned poultry meat permits improvement of their amino acid composition. The total content of essential amino acids, especially lysine and valine, is increased by adding milk proteins (soluble whey protein) to the product. The results show that the amino acid composition of the canned products containing milk proteins is almost optimal. [See FSTA (1981) 13 5S668.] STI

52

[Metabolism of deethylatrazine, deisopropylatrazine, and hydroxyatrazine by the soluble fraction (105 000 g.) from goose liver homogenates.]

Foster, T. S.; Khan, S. U.; Humayoun Akhtar, M. *Journal of Agricultural and Food Chemistry* 28 (6) 1083-1085 (1980) [6 ref. En] [Anim. Res. Inst., Agric. Canada, Ottawa, Ontario K1A OC6, Canada]

53

[Production concentration of poultry meat and eggs and vertical product integration.]

Fabovic, J. *Hydinarsky Priemysel* 22 (5/6) 163-182 (1980) [Cs] [Jihomoravské Drubezarske Zavody, Velke Pavlovice, Czechoslovakia]

This article includes a model for the concn. of poultry processing. The model virtually eliminates losses caused by transportation of the birds. STI

54

[Poultry industry and school catering in Slovakia.]

Krekova, M.; Strmiskova, M.

*Hydinarsky Priemysel* 22 (5/6) 191-201 (1980) [27 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

A survey of consumption of poultry, poultry meat products, eggs and egg products in the dining facilities of nurseries, schools, high schools and higher education colleges showed that annual consumption was generally low, ranging from 0.30 to 1.88 kg/head as compared with the recommended value of 8.2 kg/head. The main reasons were: more laborious preparation of dishes from poultry; ignorance of the fact that poultry is economical; knowledge of few recipes for poultry preparation; and little interest shown by the poultry industry. The recommended measures for improving this situation include production, and supply to school kitchens of prepared and convenience poultry meat products. Preliminary evaluation of some of these showed them to have considerable potential. STI

55

[Problems of losses within the agricultural-food processing complex with special attention paid to poultry processing.]

Buzgovic, F.; Stefanik, I.; Janotik, B.

*Hydinarsky Priemysel* 22 (5/6) 220-229 (1980) [6 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Losses occurring at poultry processing plants and their elimination are discussed; problems with waste utilization are also dealt with. STI

## 56

[New standards for natural losses of poultry and rabbit meat during air cooling and storage.]  
Guslyannikov, V. V.; Anan'ev, V. I.; Zhokina, Z. I.; Khokhlova, L. M.

*Kholodil'naya Tekhnika* No. 7, 61-62 (1980) [Ru]  
[Vses. Nauchno-issled. Inst. Kholodil'noi Promyshlennosti, USSR]

Studies on wt. losses of poultry and rabbit meat during storage are described. Meat was processed at 0° to -1°C, 95% RH and an air flow rate of 3-4 m/s, and stored at 0° to -2°C, 80-85% RH. Max. wt. loss (0.4-0.6%) occurred during the first day of storage. Wt. losses decreased subsequently, e.g. to 0.1% for poultry and 0.2% for rabbits, on the 5th day. New Soviet standards specifying wt. losses of cold stored non-packaged meat are considered. STI

## 57

Use of enzyme treated substances as binders and extenders in certain meat and poultry products.  
United States of America, Food Safety & Quality Service

*Federal Register* 45 (33, Feb. 15), 10317-10319 (1980)  
[En] [Washington, DC 20250, USA]

The Federal meat and poultry inspection regulations are amended to permit the use of enzyme-treated, Ca-reduced dried skim milk and enzyme-treated sodium caseinate as binders or extenders in meat and poultry products. Both dairy products would be combined with 10-25% calcium lactate to restore a Ca/protein ratio comparable to that found in skim milk. CAS

## 58

Transformation assay for identification of psychrotrophic achromobacters.

Juni, E.; Heym, G. A.

*Applied and Environmental Microbiology* 40 (6) 1106-1114 (1980) [42 ref. En] [Dep. of Microbiol., Univ. of Michigan, Ann Arbor, Michigan 48109, USA]

Studies on the identification of certain Gram-negative, non-motile, non-pigmented, oxidase-positive psychrotrophic coccobacilli (*Achromobacter* strains) from fish, poultry and other food products are reported. The ability to use the transformation assay for identification of achromobacters makes it possible for the first time to establish a new genus based on the genetic relatedness of its member strains. AL

## 59

Studies on the uptake and distribution of curing ingredients in the cured and smoked poultry meat.  
Raja, K. C. M.; Puttarajappa, P.; Khabade, V. S.; Mahendrakar, N. S.; Mahadevaswamy, M.; Moorjani, M. N.

*Indian Journal of Poultry Science* 15 (2) 63-67 (1980)  
[8 ref. En] [Div. of Meat Fish & Poultry Tech., Cent. Food Tech. Res. Inst., Mysore-570 013, India]

Dressed poultry was cured at 2-3°C for 24 h by immersion in curing brine containing NaCl (5 kg), sugar (3.12 kg), NaNO<sub>2</sub> (92 g) and water (28 l), with a salinometer reading of 65°. The cured poultry was then smoked for 3-4 h using wood shavings, cooled to 25-28°C and analysed. The NaCl and nitrite concn. immediately after curing and smoking are higher in the surface layers than in the interior of the product; however, this difference is eliminated during storage. When poultry is cured with a brine containing NaNO<sub>2</sub> alone, the initial nitrite concn. appears to be sufficient to compensate for the depletion occurring during storage. No microbial spoilage was observed in cured poultry products during storage for 7 days at 25-28°C. CFTRI

## 60

[Relationships between some body measurements and meat, bone and fat contents of broiler goose carcasses.]

Bochno, R.; Lewczuk, A.; Michalik, D.; Guba, W.  
*Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Zootechnika* No. 19, 79-87 (1979) [13 ref. Pl, ru, en] [Inst. Genetyki & Metod Doskonalenia Zwierząt, AR-T, Olsztyn, Poland]

9 body measurements were carried out at 4, 8, T2 and 16 wk of age on 18 male and 28 female White Italian geese reared on a private farm for delivery to the poultry factory in Iława (Olsztyn province, Poland). The birds were slaughtered at 16 wk of age, weighing about 4.5 kg, and the carcasses, cooled for 24 h at 4°C, were dissected into meat, bones and skin with fat. Mean % values with s.d. were resp. 54.8 ± 6.2, 14.5 ± 1.7, and 29.3 ± 7.1. Correlation coeff. between carcass components and the 9 measurements are tabulated. Lengths of wing, shank, trunk and breast-bone showed correlation coeff. of about 0.7 with meat and bone contents and are considered suitable indices of carcass composition. Correlation coeff. with skin + fat contents were much lower. [See also following abstr.] SKK

## 61

[Preliminary study of relationships between some slaughter measurements and meat, bone and fat contents of broiler goose carcasses.]

Lewczuk, A.; Bochno, R.; Michalik, D.; Janiszewska, M.  
*Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Zootechnika* No. 19, 89-98 (1979) [13 ref. Pl, ru, en] [Inst. Genetyki & Metod Doskonalenia Zwierząt, AR-T, Olsztyn, Poland]

Correlation coeff. are tabulated for 10 carcass measurements carried out directly after slaughter on the geese described in the preceding abstr., and for measurements carried out on removed head and neck and, after cutting-up of cooled carcasses, on wings, legs, back, breast and rump, with meat, bone and fat contents of carcass and of the different parts. Meat content of the carcass was highly correlated with wt. of carcass, head, shank, breast-bone and wing, and their meat contents, and also with chest girth, trunk length and wing length. Bone content of the carcass was highly correlated with wt. of carcass, head and shanks, trunk and wing lengths, and chest girth; skin + fat content was highly correlated with wt. of carcass and leg, and fat content of breast-bone, leg and rump. SKK

## 62

### 62

#### Poultry chilling.

Paradise, W. L., Jr.; Byars, M. L. (Airco Inc.)  
*United States Patent* 4 230 732 (1980) [En]

Poultry giblets cooled to approx. 28°F are inserted into the breast cavity of a poultry carcass cooled to 32-35°F to provide extended shelf life without freezing portions of the poultry other than the giblets. IFT

### 63

#### Poultry bagging system.

Altenpohl, W. F.; Altenpohl, P. J. (W. F. Altenpohl Inc.)  
*United States Patent* 4 228 635 (1980) [En]

A bagging device has a fixed slide surface adapted to guide movement of a poultry carcass into an open bag, a releasable carrier suspending the carcass during travel along a conveyor path, and improved hook means for suspending the carcass on a carrier at 2 suspension points. RAW

### 64

#### Identification of chlorinated phenols as degradation products of chlorinated pesticides in biological materials.

Sackmauerova-Veningerova, M.; Uhnak, J.; Szokolay, A.; Kocan, A.

*Journal of Chromatography* 205 (1) 194-198 (1981) [20 ref. En] [Res. Inst. of Preventive Med., 809 58 Bratislava, Czechoslovakia]

The identification and detn. of chlorinated phenols in meat and poultry liver contaminated with chlorinated pesticide residues from feeds was investigated by gas chromatography (GC) with an electron capture detector, by TLC and by GC/MS directly or after derivatization with methyl iodide. The method was tested on samples of poultry liver and meat from laying hens given a feed contaminated with hexachlorobenzene in which chlorinated phenols were determined as degradation products after a thermal treatment. The presence of 2,4-dichlorophenol, 2,4,6-trichlorophenol and pentachlorophenol was established. The technique is suitable for detn. of chlorinated phenols in µg amounts. AL

### 65

#### [Poultry meat in curative diets for children.]

Bobis, L.; Rudohradská, A.

*Hydinarsky Priemysel* 22 (5/6) 183-190 (1980) [Sk]  
[Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Studies on experimental groups of diabetic children receiving a curative diet consisting mainly of poultry meat and poultry meat products, as compared with a control group receiving a diet based on pork, showed that poultry, especially chicken and turkey meat, was much more suitable for this purpose. Data on levels of calories, protein, fats, Ca, P, and Fe in both diets, and their utilization, are given. STI

## 66

#### [Utilization of wastes and innovation trends in poultry processing.]

Bobis, L.; Rudohradská, A.

*Hydinarsky Priemysel* 22 (7/8) 284-297 (1980) [Sk]  
[Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Likely future increases in poultry meat consumption in Czechoslovakia are discussed together with trends in manufacture of poultry-based foods for infants, and developments in utilization of poultry wastes (e.g. for preparation of gelatin). STI

## 67

#### [Study of meat quality of young geese, of the Italian breed and of the Polish regional varieties from Kartuzy, Zator, Bilgoraj and Suwalki.]

Puchajda, H.; Faruga, A.

*Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Zootechnika* No. 20, 135-141 (1980) [16 ref. Pl, ru, en] [Inst. Hodowli & Tech. Produkcji Zwierzecej, AR-T, Olsztyn, Poland]

(i) Italian, (ii) Kartuzy, (iii) Zator, (iv) Bilgoraj and (v) Suwalki goslings were reared to 24 wk of age. Groups of 7 males and 7 females of average wt. were slaughtered at 8, 12, 16, 20 and 24 wk of age. Breast muscles were dissected from cooled carcasses and evaluated; 48 h after slaughter the muscles without skin were minced and mixed, stored at 0-2°C for 24 h and samples were examined for pH (at 48 h), contents of DM, crude ash, crude protein, crude fat, water binding capacity, and colour. Mean values with s.d. and significance of differences are tabulated in detail for all variants. Meat quality was optimal in (i)-(v) at 16 wk of age, and this age is recommended for slaughter. The highest protein content (21%) was shown by (iv). SKK

## 68

#### Plucking of water fowl.

Pritchett, M. C. H.

*British Patent* 1 570 874 (1980) [En]

Roughly plucked water fowl carcass is immersed in a bath of hot wax which, upon cooling, permits the stripping of residual feathers. IFT

## 69

#### Tight bagging system for poultry.

Altenpohl, W. F.; Altenpohl, P. J. (W. F. Altenpohl Inc.)  
*United States Patent* 4 221 106 (1980) [En]

Double leg suspended poultry is dropped from a moving conveyor and guided into bags by a nozzle assembly that effects limited expansion of each bag prior to each bird entering the bag. A ram packs each bird fully into the bag after partial entry, resulting in tight fit packaging upon withdrawal of the ram and nozzle assembly from the bag as the bag is detached and dropped onto a receiving surface. AS

## 70

[Evaluation of use of krill meal in fattening diets for duck broilers.]

Uzieblo, L.; Danczak, A.; Tarasewicz, Z.; Kirszke, L.  
*Roczniki Naukowe Zootechniki* 7 (1) 271-283 (1980)  
 [6 ref. Pl, en, ru] [Inst. Hodowli i Tech. Produkcji Zwierzecej Akad. Rolniczej, Szczecin, Poland]

594 Pekin ducks were used in a feeding trial up to 7 wk of age conducted to evaluate effects of starter diets with 5-15% krill meal and finisher diets with 2-12% krill meal on growth, carcass quality and meat quality. Trials were conducted with pink and beige krill meals. Tables of results are given, including data for eviscerated wt., slaughter yield (with or without giblets), wt. and % of giblets, wt. and % of skin, wt. and % of breast and leg cuts (with or without bones), and the composition (DM, crude protein, ether extract, ash) of the meat. The results show no significant effect of the diets studied on carcass quality or the composition and organoleptic properties of the meat. AJDW

## 71

Accredited laboratory program.

United States of America, United States Department of Agriculture

*Federal Register* 45 (218, Nov. 7) 73947-73954 (1980)  
 [En] [Washington, DC, USA]

Regulations are proposed to establish standards and procedures for accreditation on non-USDA chemical laboratories for analysis of official meat and poultry samples for residues of chemicals and protein, moisture, fat and salt contents. Standards of performance for initial acceptance of the laboratories for residues of pesticides, PCB, polybrominated biphenyls (PBB), and arsenic (0.1-1 p.p.m.) are coeff. of variation (COV) of 15%; and for continued acceptance, 20%. For DES (2 µg/kg), corresponding values are 12 and 16%; for ipronidazole (2 µg/kg), 15 and 20%; and for nitrosamines (5 µg/kg) 8 and 12%. Minor deviations are those where the result of the non-USDA and FSQS laboratory split or check sample result is > 2 x but ≤ 4 x the COV × the mean of the 2 results; a major deviation exceeds this value. Minor deviations are also those which result in differences between laboratory and Food Safety and Quality Service (FSQS) values of 0.5-1.0% for protein, 1.0-2.0% for moisture and fat, and 0.3-0.6% for salt; major deviations exceed these values. CAS

## 72

[Experience with use of isoelectric focusing for identification of the species of origin of meat, poultry and fish.] Erfahrungen mit der Isoelektrischen Fokussierung bei der Tierartenbestimmung.

Führling, D.; Gersonde, C.

*Lebensmittelchemie und Gerichtliche Chemie* 34 (6) 135-138 (1980) [18 ref. De] [Abteilung A, Landesanstalt für Lebensmittel-, Arzneimittel- & Gerichtliche Chem. Berlin, Invalidenstrasse 60, 1000 Berlin 21]

Studies on use of (i) thin layer or (ii) ultrathin-layer isoelectric focusing of proteins for identification of the species of origin of meat or fish samples are described. Frozen samples of the tissue under examination are

commminuted and dispersed in carbon tetrachloride; the organic phase is then discarded, and the residue is ultrasonically dispersed in 0.05M glycine solution. The dispersion is filtered, and the filtrate subjected to clean-up on a Sephadex G-25M column (elution with 0.05M glycine solution). Details are given for separation by (i) and (ii), and for staining, preservation and evaluation of the electropherograms. Examples are given of electropherograms and densitometer records for a range of species of mammals, poultry and fish. It is concluded that (i) and (ii) are highly suitable for identification of the species of origin of tissue samples. Advantages of (ii) include greater rapidity, reduced requirement for carrier ampholytes, and better and more reproducible separation of protein peaks. AJDW

## 73

[Economics of poultry meat production in Czechoslovakia under various conditions.]

Fabovic, J.  
*Hydinarsky Priemysel* 22 (9/10) 317-338 (1980) [Cs]  
 [Jihomoravské Drubzarske Zavody, Velke Pavlovice, Czechoslovakia]

## 74

[Development and testing of products for school feeding.]

Krejova, M.

*Hydinarsky Priemysel* 22 (9/10) 339-350 (1980) [12 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

The introduction of convenience foods and ready-to-serve dishes for school feeding proved to be a necessity. Frozen ready-to-serve dishes based on poultry meat were favourably accepted. Group packages containing 20 servings proved to be an advantage. It was concluded that provision of poultry dishes for school children would affect favourably the future consumption of poultry meat. STI

## 75

[Identification of animal species in meat, fish and derived products by means of protein differentiation with electrophoretic methods. II. Qualitative and quantitative analysis of raw binary meat mixtures by isoelectric focusing in polyacrylamide gel (PAGIF).] Proteindifferenzierung mit elektrophoretischen Methoden bei Fleisch, Fisch und abgeleiteten Produkten. II. Qualitative und quantitative Analyse roher binärer Fleischmischungen durch isoelektrische Focussierung in Polyacrylamidgel.

Kaiser, K.-P.; Matheis, P.; Kmita-Dürrmann, C.;

Belitz, H. D.

*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 171 (6) 415-419 (1980) [10 ref. De, en] [Inst. für Lebensmittelchem., Tech. Univ., Munich, Federal Republic of Germany]

Identity of animal source of raw meat in binary mixtures may be determined by PAGIF of aqueous extracts from fresh or frozen meat mixtures. Extracts are focused on prepared thin-layer polyacrylamide gels (LKB Ampholine PAG plates), stained in Coomassie Brilliant Blue without fixing, and stained gels are

analysed by transmission densitometry.

Electrophoretograms and densitometer traces of proteins from single animals and mixtures are shown for beef, pork, venison, roe deer, impala, springbok, chicken, and turkey. Composition of binary mixtures can be determined to a limit of 2-5% level of one component. [See FSTA (1980) 12 9A638 for part I.] DIH

## 76

[Effect of temporary feed restrictions on the readiness of goose broilers for slaughter.]

Bielinska, K.; Bielinska, H.; Bielinski, K.; Trojan, M.; Pakulska, E.; Jamroz, D.; Karasinski, D.  
*Roczniki Naukowe Zootechniki* 7 (2) 269-280 (1980)  
[18 ref. Pl, en, ru] [Zootech. Zaklad Doswiadcza Inst. Zootech., Koluda Wielka, Poland]

360 White Italian goslings were used in a study on effects of temporary feed restriction during growth on live wt. gain, feed efficiency and carcass and meat quality. All were fed ad lib. up to 4 wk of age; from 4 to 7 wk of age, groups were fed (i) ad lib., (ii) 85% of the ad lib. level or (iii) 70% of the ad lib. level. All birds were then fed ad lib. up to slaughter at 9, 10 or 11 wk of age for (i), (ii) and (iii) resp. Tables of results are given, including data for slaughter wt., eviscerated carcass wt., carcass yield, the % breast cut, breast muscle, skin + subcutaneous fat, thigh cut, thigh muscle, skin + thigh fat and internal fat in the carcass, the DM, crude protein, ether extract and ash contents of the carcass, and the colour, water holding capacity, free water content and organoleptic properties of the meat. The results are discussed in detail. Treatments (i) and (ii) tended to increase breast muscle yield and the quality of the meat; however, the lower growth rate and higher total feed consumption render these treatments economically unjustifiable. AJDW

## 77

[Electrophoretic patterns of fresh and frozen meat.] Tiecco, G.

*Archivio Veterinario Italiano* 31 (3/4) 108-110 (1980)  
[16 ref. It, en] [Istituto di Ispezione degli Alimenti, Univ. degli Studi di Bari, Bari, Italy]

Comparative studies were conducted on the electrophoretic patterns of (i) fresh beef (held at 2-3°C) and (ii) frozen beef (held at -20°C). The muscle samples were homogenized with 0.04M phosphate buffer (pH 7.6), the homogenate was centrifuged, and the supernatant was subjected to electrophoresis on cellulose acetate gel using borate buffer. A diagram of results is given. 4 bands were present in the electropherogram of (i), duration of holding at 2-3°C having no effect. Electropherograms of (ii) show gradual disappearance of the slowest-migrating band; this started fading in samples frozen stored for 15 days, and had disappeared completely in samples stored for 70 days. The other 3 bands on the (ii) chromatogram remained unchanged throughout frozen storage. AJDW

## 78

[Possibilities of objective evaluation of fatty goose liver quality.]

Kostadinov, K.; Lalov, M.; Danchev, S.  
*Khranitelna Promishlenost* 28 (6) 19-21 (1979) [13 ref. Bg]

Fatty goose livers from the poultry factory in P'rvomai (Bulgaria) which in 1977 produced 60.3% of the total Bulgarian goose liver production were used in this study. The livers were classified into 4 quality categories by organoleptic assessment of appearance, colour and consistency when freshly taken from cooled carcasses, and after holding on ice for 12 h. Batches of about 50 fresh and 50 cooled livers of each category were examined for colour characteristics, measured using a 'Momcolor' spectrophotometer over the wavelength range 400-750 nm and for consistency (elasticity and structural and plastic resistance) using an OFA (German Democratic Republic) penetrometer. Mean values with s.e. are tabulated for each variant for colour characteristics (expressed in the CIE system and in Hunter values), and for the 3 consistency characteristics. It is concluded that the  $\lambda$  and P values of the CIE system remained relatively constant throughout the quality range, and were thus unsuitable for the intended purpose; the Hunter Rd value increased, and the Hunter a value decreased progressively with decrease in quality of cooled livers, relationships being less clear in fresh livers; the 3 consistency characteristics decreased significantly with decrease in quality in the cooled livers. SKK

## 79

[Meat yield of 28-to-50-day old pigeons.]

Ballay, A.; Kustosne Pöcze, O.  
*Baromfitenyesztes es Feldolgozas* 27 (3) 128-130 (1980) [Hu] [Mezögazdasagi Föiskola, Kaposvar, Hungary]

The examination of meat yield of 60 Autosex Texan meat pigeons, slaughtered at ages of 28-32, 38-42 and 48-52 days, showed that, in both males and females, the meat yield increased with age. Between the ages of 30 and 50 days the grill-ready wt. increased by an average of 20 g, despite an increase of only 10 g in live wt. Over the same age range, roasting losses decreased from 27.99% for males, and 27.01% for females to 25.35% and 25.15%, resp. ESK

## 80

Frozen poultry.

Panda, P. C.  
*Poultry Guide* 17 (11) 171-174 (1980) [En] [Anim. Products Tech., Haryana Agric. Univ., Hissar 125 004, India]

Correct methods for the processing and storage of frozen poultry and their products are presented. The loss of B-vitamins in culled hens after 8 months of storage at -18°C was 12-42% for thiamin, 3-11% for riboflavin, and 5-10% for niacin; in broilers, the corresponding losses were 5-16%, 8-32%, and 9-22%, resp. CFTRI

81

**The development of a duck roll.**

Ashoor, F. A.; Maurer, A. J.

*Poultry Science* 59 (7) 1423-1429 (1980) [32 ref. En]  
[Dep. of Poultry Sci., Univ. of Wisconsin, Madison,  
Wisconsin 53706, USA]

Fresh-frozen deboned duck meat and skin were analysed for their chemical composition for subsequent formulation into a duck roll product. Various levels of skin and fat as well as other flavour ingredients such as conc. orange juice were incorporated into the rolls to determine their effect on product quality. Objective and subjective measurements were used to evaluate the treatments. As the amount of added skin fat increased, the quality of the duck rolls decreased. 10% added skin fat (8.84% fat on analysis) yielded the most acceptable duck roll. 20% added skin, however, resulted in decreased quality of the rolls. A level of 2.5% conc. orange juice in the formulation imparted a very delicate orange flavour to the duck rolls. AS

82

**Two selective enrichment media for the isolation of *Salmonella* from mechanically deboned poultry meat.**Greenwood, D. E.; Swaminathan, B.; Morse, E. V.  
*Journal of Food Science* 45 (5) 1131-1135 (1980) [32 ref. En]  
[Dep. of Foods & Nutr., Purdue Univ., W. Lafayette, Illinois 47907, USA]

2 selective enrichment media were developed for isolation of salmonellae from foods. The first, experimental broth 1, contained MgCl<sub>2</sub> and sodium cholate as the selective ingredients. The second, experimental broth 2, contained 8 mg/l sodium sulphadiazine in addition to MgCl<sub>2</sub> and sodium cholate. The 2 broths were evaluated against conventional selective enrichment media in the isolation of salmonellae from naturally contaminated mechanically deboned poultry meat. Of 100 such samples, 22 were positive for *Salmonella* after enrichment in selenite cystine broth, 12 were positive after enrichment in tetrathionate broth, 50 were positive after enrichment in experimental broth 1, and 60 samples were positive after enrichment in experimental broth 2. The inhibition of interfering Gram negative organisms was significantly greater in the 2 experimental broths than in the conventional selective enrichment broths. IFT

83

**Development of carcass shape in Pekin and Muscovy ducks.**

Swatland, H. J.

*Poultry Science* 59 (8) 1773-1776 (1980) [6 ref. En]  
[Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Male and female White Muscovy and White Pekin ducks were killed at weekly intervals from hatching to 10 wk. Their carcasses were dissected, and lengths of skeletal units and wt. of representative muscles were recorded. Data were analysed for allometric (proportional) growth relative to keel length or unilateral breast muscle wt. using Huxley's allometric growth equation. Wing bones tended to grow proportionally faster than keel length; this was most

evident in Muscovies, possibly because of their greater powers of flight. Skull and leg bones grew proportionally more slowly than keel length. *Biceps brachii*, *semitendinosus* and *gastrocnemius* muscles grew proportionally more slowly than breast muscles. The existing pattern of allometric growth in duck carcasses suggests that the response of total muscle mass to selection for increased breast muscle mass will be greater in Muscovies relative to Pekins with similar breast improvement. AS

84

**Consumer attitudes toward poultry.**

Short, J. R.; Goodwin, T. L.; Waldroup, P. W.; Johnson, Z. B.

*Poultry International* 19 (3) 106, 108, 110, 127, 129 (1980) [En, de, fr, it, ja, ar, es] [Univ. of Arkansas, Fayetteville, Arkansas 72701, USA]

A brief account is given of a survey on consumer attitudes to poultry in the USA; a high proportion of the consumers questioned were young married women with a rural background. Taste and economy were the major reasons for purchase of poultry; nutrition, ease of preparation and variety were also of importance. Only 36% of consumers used giblets when these were included; of these, 10% used them only as pet food. 29% of the consumers expressed no dislikes of poultry. 17.3% disliked cutting up whole chickens, 17.3% reported problems with cooking poultry, and 7.7% stated that their spouse did not like poultry. Other dislikes included, in order of decreasing incidence: tired of eating chicken; waste fat; skin; odour; giblets; inadequate cleaning by the processor; cost; deboning; and darkened bones in frozen chicken. AJDW

85

**Muscovy duck: a breed which will develop.**

Fedeli Avanzi, C.

*Poultry International* 19 (5) 14, 16, 18, 20, 103, 110 (1980) [En, de, fr, it, ja, ar, es] [Univ. degli Studi di Pisa, Pisa, Italy]

The potential for increased production of Muscovy ducks (*Cairina moschata*) for meat is briefly discussed, with reference to: the desirably dark meat colour; nutritional value (breast muscle contains 21% protein when raw, ≥ 33% protein after cooking); consumer acceptance; and problems with relatively late development of breast muscle. AJDW

86

**Europe's most modern processing plant.**

Markert, G. H.

*Poultry International* 19 (1) 74, 76, 78, 80, 82, 84, 97-100 (1980) [En, de, fr, it, ja, ar, es] [Machinefabriek Markert BV, Ede, Netherlands]

The new Wielener Geflügelschlachterei poultry slaughterhouse and processing plant (throughput up to 10 000 birds/h) in the Federal Republic of Germany is described, with reference to: delivery and handling of the live birds; the killing line (with reference to stunning, killing, scalding and plucking); evisceration; neck cutting; separation, packaging and cooling of giblets; carcass inspection; weighing; chilling; classification on the basis of wt.; portioning; packaging, freezing; and waste disposal. AJDW

87

[Prohibition of slaughter and order for disposal of poultry.] Schlachtverbot und Tötungsanordnung bei Geflügel.

Zrenner, K.; Naser, S.

*Schlachten und Vermarkten* 80 (6) 182-185 (1980)

[De][Bayer. Staatsministerium des Innern, Odeonsplatz 3, 8000 München, Federal Republic of Germany]

Regulations of the Federal Republic of Germany law on poultry meat hygiene (Geflügelfleischhygienerecht) relating to the disposal of diseased poultry, and the prohibition of the slaughter of suspect animals in poultry slaughterhouses (except for animals already on the premises and not taken away within a specified time) are discussed. RM

88

Acifluorfen; tolerances for residues.

United States of America, Environmental Protection Agency

*Federal Register* 45 (58, March 24) 18990-18991 (1980) [En][Washington, DC, USA]

Tolerances are established under the Federal Food, Drug and Cosmetic Act for the combined residues of the herbicide sodium salt of acifluorfen (Na-5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoic acid>) and its metabolites (the corresponding acid, methyl, ester, and amino analogues) as follows: soybeans, 0.1 p.p.m. and liver and kidneys of cattle, goats, hogs, horses and sheep, meat, fat and meat byproducts of poultry, milk and eggs, 0.02 p.p.m. CAS

89

Statutory food controls exercised by the Department of Agriculture.

O'Toole, T.

*IFST Proceedings* 13 (3) 207-211 (1980) [En]

Scope of controls exercised by the Department of Agriculture in the Irish Republic in accordance with relevant domestic or EEC regulations are briefly described for the following individual food categories: dairy produce; fruit and vegetables; potatoes; poultry and eggs; and fresh meat and meat products. DIH

90

Muscle fiber histochemistry in breast and leg meat of geese.

Swatland, H. J.

*Canadian Institute of Food Science and Technology Journal* 13 (3) 135-136 (1980) [9 ref. En][Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario N1G 2W1, Canada]

Geese can perform a useful function by eating weeds, but the carcass value to consumers is low due to the high fat and poor muscle contents. Genetic selection to increase muscle and reduce fat would be valuable; this preliminary study was undertaken to examine the histological types of muscle fibres in goose breast and leg meat. *Pectoralis* and *sartorius* muscles were frozen in liquid N<sub>2</sub>, serial frozen sections were cut and reacted for ATP-ase, succinate dehydrogenase (SDH) and

glycogen phosphorylase. Based on these 3 reactions from 150 fibres in each muscle, 8 fibre types were detectable: the occurrence and frequency of each type in *pectoralis* and *sartorius* muscle is tabulated. The phosphorylase reaction is considered to be unreliable. Dark carcass muscles contained large numbers of strong ATP-ase fibres. Weak SDH fibres were much larger than strong SDH fibres (x 2 in *sartorius* muscle and x 3 in *pectoralis* muscle.) ELC

91

[Development of weights and valuable cuts contents of duck carcasses up to 10 weeks of age.] Die Entwicklung von Entenschlachtkörpern und ihrer wertvollen Teilstücke in den ersten 10 Lebenswochen. Hattenhauer, H.; Tieu, H. van

*Archiv für Tierzucht* 23 (5/6) 363-375 (1980) [5 ref. De, en, ru][Sektion Tierproduktion & Vet. Med., Karl-Marx-Univ., 7030 Leipzig, German Democratic Republic]

Studies on development of carcass characteristics of male and female hybrid Peking ducklings over the first 10 wk of life are described. Tables and graphs of data are given for % breast, leg and breast + leg in the oven-ready carcass, and % meat, bone and skin in the carcass, and in the breast and leg cuts. Carcass wt. increased with increasing age: carcass % increased only up to 7 wk of age. Considerable increases in breast meat wt. and % were observed over the period 8-10 wk of age, especially in males. Breast skin % increased up to 5 wk of age, then decreased. Bone % in the breast cut increased up to 8 wk of age in males, 7 wk in females, than decreased. Leg wt. increased up to 8 wk of age, but leg % in the carcass decreased after 6 wk of age. Tissue composition of the leg differed little between slaughter ages. It is concluded that slaughter at ages <8 wk is likely to adversely affect carcass quality. AJDW

92

Bacteriological quality and shelf life of minced poultry meat.

Panda, P. C.

*Indian Journal of Poultry Science* 15 (4) 281-284 (1980) [15 ref. En][Dep. of Anim. Products Tech., Haryana Agric. Univ., Hissar - 125 004, India]

During storage of minced poultry meat at 1.7 ± 1°C for 15 days, the mean log counts increased for total aerobes and psychrotrophs, and decreased for coliforms, *Escherichia coli*, *Staphylococcus aureus* and *Clostridium perfringens*. The odour and appearance of the product did not change and the product was edible, as the microbial count was lower than the min. (10<sup>3</sup>/g tissue) needed for spoilage. CFTRI

93

[Foie gras production from male Muscovy ducks. Analysis of sources of variation.]

Babile, R.; Matheron, G.; Delpech, P.; Farran, M. T.

*Annales de Zootechnie* 29 (3) 265-276 (1980) [17 ref. Fr, en][Lab. de Zootech. & Productions Anim., Ecole Nat. Supérieure Agron., 31076 Toulouse Cedex, France]

Studies were conducted on foie gras production using 2 Muscovy duck breeds, their cross, and a commercial

Muscovy duck strain, fed alike up to 12 wk of age then force-fed by one of 2 force-feeders for a further 3 wk before slaughter. Wt. of the ducks at various ages were determined, together with liver wt., liver quality grade, and wt. loss on heating at 55° or 105°C. Tables and graphs of results are given, including correlations between the characteristics studied. The results show significant differences between the genotypes for all variables studied, and differences between force-feeders for the characteristics of the liver. The experimental crossbred gave slightly better foie gras characteristics than the other groups. High liver wt. was significantly correlated with high wt. loss during heat treatment. AJDW

## 94

[Quick-freezing equipment in a poultry processing plant.]

Szentivanyi, G.

*Hüttöipar* 27 (3) 65-71 (1980) [7 ref. Hu, en, ru]

[IPARTERV, Deak Ferenc u. 10., Budapest, V., Hungary]

The characteristics and relative merits of standard freezers and automatic carton freezers are discussed; it is concluded that automated carton type freezers, e.g. those manufactured by Frigoscandia, Holima or Linde, give a better-quality product, and have lower energy requirements and running costs. They may be installed without enlargement of existing facilities. AJDW

## 95

Biochemical and biological evaluation of pigeon meats. Effect of type, age and sex.

El-Sayed, W. A.; Shehab, A. H.; Mourad, F. E.; El-Nahry, F. I.; Said, A. K.

*Nahrung* 24 (9) 821-828 (1980) [35 ref. En, de, ru] [Univ. Coll of Girls, Ain Shams Univ., Heliopolis, Egypt]

The edible parts of 3 Egyptian var. (Balady, Reomy and Malty) of pigeon (*Columba domestica*) were examined for chemical composition (water, protein, fat, fibre, ash, vitamins B<sub>1</sub> and B<sub>2</sub>, Ca, P and Fe) and for nutritional value [protein efficiency ratio (PER), net

protein ratio (NPR), and net protein utilization (NPU)], with results tabulated. Pigeon meat is relatively fatty, has high energy value and contains the necessary concn. and proportion of essential amino acids for human nutrition. Concn. of thiamin, riboflavin, Ca, P and Fe are higher than in other meats. NPR and PER values of muscle proteins were higher in Reomy, NPR 2.41-5.37, and PER 1.54-2.15 than in Balady, 1.02-2.54 and 0.52-0.72, resp. NPU values ranged from 47.1 to 72.9, depending on var., sex and feeds. IN

## 96

[New method for determination of vitamin E in liver.]

Burczynska-Niedzialek, A.; Harenza, T.;

Tyczkowska, K.

*Roczniki Naukowe Zootechniki* 7 (2) 59-63 (1980) [9 ref. Pl, en, ru] [Centralne Lab. Przemyslu Paszowego, 20-950 Lublin, Poland]

A simple method intended for testing adequacy of

broiler rations by  $\alpha$ -tocopherol determination in fresh livers is described. It consists in principle in extraction of  $\alpha$ -tocopherol with a 1:1 v/v diethyl ether:hexane solvent system from a sample after homogenization, saponification with ethanolic KOH, deproteinization with trichloracetic acid, and TLC of the extract on silica gel using a petroleum ether/diethyl ether (3:1 v/v) solvent system. In tests with broiler livers from the Lublin (Poland) poultry factory, a mean value of 2.54  $\mu$ g/g (s.d.  $\pm$  0.39) was obtained with 6 replicates; recovery was 88%. SKK

## 97

[Operational measurement of tractive force in overhead conveyors in the food industry.] Messung der Zugkraft an Oberbahnen in der Lebensmittelindustrie während des Betriebes. (In 'II. Kolloquium über Lebensmittelmaschinen, Szombathely, 9.-12. 10. 1979' [see FSTA (1981) 13 8E385].) [Lecture]

Huszar, I.; Müller, Z.; Csapo, G. pp. 78-82 (1979) [De]

In view of the importance of the tractive force of overhead conveyors in slaughterhouses and poultry processing plants, the active forces in the drive chain of a conveyor were measured, using an electric tensometer. Results are discussed. STI

## 98

Transfer of drug-resistance in *Escherichia coli* strains isolated from poultry, cattle and mutton.

Bahl, B. S.; Mehrotra, P. N.

*Indian Veterinary Journal* 54 (7) 503-508 (1977)

[11 ref. En] [Dep. of Path. & Bact., Coll. of Vet. & Anim. Sci., Bikaner, Rajasthan, India]

Studies were conducted on the resistance of *Escherichia coli* strains from poultry, cattle and sheep carcasses and faeces to antibiotics (ampicillin, furoxone, neomycin, dihydrostreptomycin, tetracycline, sulphonamides, nalidixic acid, chloramphenicol, colymycin and aureomycin). 20 isolates from each spp. of animal were tested. Tables of results are given, showing the number of resistant strains, and transfer of drug resistance from *E. coli* to *Salmonella typhi*. A fairly high incidence of resistance to all drugs except chloramphenicol and nalidixic acid was recorded. Transferable resistance to ampicillin, furoxone, neomycin, tetracycline and aureomycin was observed. AJDW

## 99

High pressure liquid chromatographic determination of penicillic acid residues in poultry. [Lecture]

Hanna, G. D.; Phillips, T. D.; Cysewski, S. J.; Kubena, L. F.; Ivie, G. W.; Heidelbaugh, N. D.;

Witzel, D. A.; Hayes, A. W.; Williams, W. L.

*Federation Proceedings* 39 (3, II) 1102 (1980) [En]

[Dep. Vet. Public Health, Texas A&M Univ., College Station, Texas 77843, USA]

Penicillic acid (PA) is a tautomeric mycotoxin ( $\Delta\alpha\beta\gamma$ -hydroxylactone, or open ring substituted  $\gamma$ -keto hexenoic acid) with reported cardiotoxic, teratogenic and carcinogenic activity. Its presence in contaminated feed represents a potential public health hazard. A

reverse-phase HPLC method is proposed for determining authentic PA residues in poultry tissues. Optimization of chromatography was achieved for PA using a mobile phase consisting of acetonitrile:H<sub>2</sub>O. PA was detected by UV absorption at 254 nm, identified by retention time and quantified by peak area determined by digital electronic integration. Spiked plasma, parenchymal tissues, brain, muscle, alimentary and intestinal tract contents were homogenized, sonicated and acid hydrolysed followed by extraction with ethyl acetate and subsequent transfer to an acetonitrile/water/hexane solution resulting in a rapid, reliable and sensitive method of recovery and quantitation of PA. Acute oral dosing of chicks with PA resulted in significant levels of the mycotoxin (detected by HPLC and confirmed by TLC) 4 h postdosing in kidney, heart, gizzard and contents, and intestinal contents. These results suggest the possibility of contamination of poultry by PA. [See FSTA (1981) 13 8A461.] AS

## 100

**Reducing poultry processing electric demand.**

Whitehead, W. K.; Shupe, W. L.

*Transactions of the ASAE* 23 (6) 1586-1589 (1980)  
[4 ref. En][USDA-SEA-AR, Athens, Georgia, USA]

## 101

**What is a vacuum massage system?**

Konig, J.

*Food, Flavourings, Ingredients, Packaging and Processing* 1 (11) 32-33 (1980) [En]

A description is given of the vacuum massage system, a gentle method of permeating brine through a meat mass and extraction of salt soluble proteins. The time cycle is controlled by process time, rest time and massage time. 2 types of massage drum; normal and special, are available and the system is equipped with 2 operation speeds. The system is designed for versatility, practicality and simplicity, and requires little maintenance. It has been found by processors to provide increased yields and to reduce cooking loss compared with conventional 'impact' or 'stir' tumbling. Application of the system to the preparation of beef, mutton, pork, tongue, game, poultry, veal and bacon is briefly mentioned. VJG

## 102

**Meat and poultry inspection: the current issues.** (In 'Proceedings: Meat processing conference') [Lecture] Dubbert, W. H.

pp. 1-9 (1979) [En][Tech. Services, MPI, USDA-FSIS, Washington, DC 20250, USA]

Plans to reduce the cost of meat and poultry inspection are examined in sections, viz. nitrites, residues, net wt., mechanically deboned products, new methods of inspection (sequenced inspection, modified tradition), and quality control. [See preceding and following abstr.] LH

## 103

[Feed consumption, feed utilization and growth patterns of crossbred ducks.] Futterverbrauch, Futterverwertung und Wachstumsveränderungen bei Entenkreuzungen.

Lühmann, M.

*Archiv für Geflügelkunde* 44 (6) 237-242 (1980) [6 ref.  
De, en, fr, ru][Inst für Kleintierzucht,  
Bundesforschungsanstalt für Landw., Braunschweig-  
Volkenrode, Celle, Federal Republic of Germany]

Studies on the growth and carcass characteristics of Muscovy x Pekin crossbred ducks are described. Tables of data are given for yields of carcasses prepared in various ways, and breast muscle wt. and % at various ages. Eviscerated carcass % was 85.0 at 8 wk of age; 86.1 at 9 wk and 85.2% at 10 wk of age; corresponding data for oven-ready carcass % were 72.2, 73.2 and 73.0%, resp. At 8 wk of age, breast muscle wt. and % in the carcass were 293.9 g and 15.0% in females, 379.0 g and 17.0% in males. Corresponding values at 10 wk of age were: females 422.6 g and 20.9%; and males 490.6 g and 21.7%. Comparative data are included for purebred Muscovy and Pekin ducks, showing the superior growth and carcass quality of the crossbreds. AJDW

## 104

[Trends in specialization in the poultry industry.]

Stefanik, I.

*Hydinarsky Priemysel* 22 (7/8) 273-283 (1980) [Sk]  
[Vyskumný Ustav Hydinarskeho Priemyslu, Bratislava,  
Czechoslovakia]

Characteristics of the poultry industry are outlined, and the whole poultry industry is classified into poultry, slaughtering plants, poultry meat product processing plants, egg processing plants and egg products manufacturing plants. For poultry industry modernization, a high degree of specialization is necessary. STI

## 105

[Changes in import regulations for meat and poultry.]

Die geänderten Einfuhrvorschriften für Fleisch und Geflügelfleisch.

Wiese, H.

*Schlachten und Vermarkten* 80 (11) 344-349 (1980)  
[De][Staatliches Vet.-Amt, Goebenstrasse 16,  
2800 Bremen, Federal Republic of Germany]

Changes in Federal German meat and poultry inspection regulations, subsequent to the application of EEC directives 77/99 and 72/462, are outlined. Tables show the regulations for imports from EEC countries, third countries and the German Democratic Republic (covering fresh carcasses, carcass halves, quarters, portions, by-products and meat products from beef, pork, lamb, goat, horses, and other domestic animals e.g. rabbits, waterbuffalo, game as well as prohibited imports (meat from dogs, cats, Canidae, Felidae, badgers, apes, boars, etc.). RM

## 106

Water content of frozen or deep-frozen poultry - examination of methods of determination: guinea-fowls and ducks.

European Communities Commission

*Information on Agriculture* No. 67, 152pp. ISBN 92-825-1379-5 (1979) [En]

A detailed account is given of an international study on methods for evaluation of the extraneous water content of frozen guinea-fowl and domestic ducks. Aspects considered include drip losses from birds after immersion chilling; regressions between total or physiological water and protein contents of poultry carcasses, and their potential use for evaluation of added water content; effects of variables such as sex, wt. or breed on estimation of extraneous water; the accuracy and reliability of results based on water/protein regressions; and definition of limits for acceptance vs. rejection of carcasses. Numerous tables and graphs of experimental data are given. The results are discussed in detail, and implications for establishment of standard methods for detn. of extraneous moisture in frozen guinea fowl and Pekin ducks are considered. AJDW

## 107

Milk and meat iodine content: relation to human health. [Review]

Hemken, R. W.

*Journal of the American Veterinary Medical Association* 176 (10, II) 1119-1121 (1980) [28 ref. En]

This review article discusses the increasing intake of I by inhabitants of the USA. Dairy products contribute 38-50% of this I in adults and 56-85% in infants and toddlers. Meat, fish, poultry and cereal products are the next largest contributors. Before 1970, milk I contents were generally < 100 µg/l, but more recently values of > 4000 µg/l have been reported on individual farms. Sources of I in milk are: organic iodide in feedstuffs, iodophor teat dips, and solutions used for cleaning teatcups and milking equipment. The I content of meat increases with increasing I intake, but the transfer of I to meat is much lower than that to milk. The additive effect of I from several sources, as well as the improper use of any of the sources, could increase the I content of milk to > 500 µg/l which could lead to an increase in thyroid disorders. MEG

## 108

Current food safety and quality service residue control program.

Engel, R. E.

*Journal of the American Veterinary Medical Association* 176 (10, II) 1145-1147 (1980) [9 ref. En]

A brief history of US regulations concerning the hygienic quality of meat and poultry is given. A residue monitoring programme was begun in 1967, and in 1979 a government report estimated that 14% of all meat and poultry samples tested over a 2 yr period contained illegal and potentially harmful residues of pesticides and drugs. Certain substances (hormone growth promoters and herbicides) were not monitored at this stage, so a

new programme was designed. This programme detects approx. 50 chemicals: pesticides, drugs, hormones, antibiotics and environmental contaminants in meat and poultry, at monthly intervals, in animals randomly selected from federally inspected slaughter plants and from import areas. Surveillance programmes also select animals on the basis of the likelihood of their having been exposed to chemical X. Specific needs for sulphonamide residues in swine to be reduced, and difficulties in testing schemes for measuring such residues are outlined. Swab tests on premises, live animal swab tests and enzyme-labelled antibody tests are described. LH

## 109

[The Societe Avicole Serentaise, of the Galina group: 3000 chickens/hour.]

Anon.

*RTVA* 19 (160) 44-46 (1980) [Fr]

The Societe Avicole Serentaise slaughterhouse for broilers and guinea fowl at Serent, France is described, with reference to: delivery and reception of the birds; stunning; bleeding; scalding; plucking; removal of necks and feet; evisceration; processing of gizzards; rinsing; surface drying; cooling; packaging; handling facilities; and waste disposal. AJDW

## 110

[Inspection of retail sale premises for foods of animal origin. Technical notes. Poultry and poultry meat. Rabbits. Game.]

Jouve, J.-L.; Rozier, J.; Adroit, J.; Boutet, P.; Cazaillet, M.; Lagoin, Y.; Mailly, P.; Olry, J.; Quinet, G.; Rigoulet, J.

*RTVA* 19 (157) 45-53 (1980) [Fr] [Ecole Nat. Vet., Alfort, France]

Technical notes are given on requirements concerning quality, etc. of poultry, cut poultry meat, rabbits and game. Aspects considered include: presentation and/or packaging; storage temp. and max. storage life; official marking to indicate hygiene inspection; labelling; requirements concerning preparation and/or processing; composition; microbiological quality; unacceptable defects, diseases, etc.; and legal aspects. AJDW

## 111

Effects of heat processing in cans and retort pouches on sensory properties of fowl meat.

Lyon, B. G.; Klose, A. A.

*Journal of Food Science* 46 (1) 227-230, 233 (1981) [12 ref. En] [USDA, SEA-AR, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30604, USA]

Fowl meat processed in cans and flexible retortable pouches was evaluated for heat effects on sensory properties. A trained panel evaluated texture and off-flavour of canned boned chicken, uncooked fowl meat retorted in flexible pouches, cooked meat retorted in flexible pouches, and simmered fowl meat (control). Results indicated that the retort pouch process may offer a method for improving the texture of processed fowl meat from spent hens by adequately cooking to tenderize the meat but not overcooking it to the extent that meat chunks are reduced to fibrous, shredded, or stringy components. Off-flavour development was related to precooking before retorting. JFT

112

[Consumption of poultry in restaurants.]

Leseur, D. R.

RTVA 19 (160) 17-19 (1980) [Fr]

Use of poultry in restaurants, etc., is discussed with reference to: general hygiene requirements; pre- and post-mortem inspection of poultry at the slaughterhouse; microbiological standards; presentation and transport conditions for raw poultry; commercial specifications for poultry; labelling requirements; nutritional aspects; and cooking and serving of poultry and poultry-based products. AJDW

113

[Poultry and poultry products.]

Paquin, J.

RTVA 19 (160) 5-13, 15 (1980) [7 ref. Fr] [Ets Guyomarc'h, BP 234, 56006 Vannes Cedex, France]

Aspects discussed include: per capita consumption of poultry in France; chickens (covering legal definitions, presentation, quality grading, labelling, frozen chicken, chicken products, and chicken offal); turkeys (covering legal definition, presentation of whole carcasses, fresh, frozen and cooked turkey products, turkey offal); mechanically-separated poultry meat (composition, functional properties, uses and legal aspects); general characteristics of poultry meats (composition, physical properties, hygienic quality); and use of poultry meat in the food industry (in canned products, dried soups, etc., and in meat products). AJDW

114

[Effects of vacuum packaging without prior refrigeration on the shelf-life of poultry carcasses.]

Colin, P.; Lahellec, C.

RTVA 19 (161) 11-19 (1980) [15 ref. Fr]

Descriptions are given of a series of studies on vacuum-packaging of non-cooled poultry carcasses, and its effects on subsequent microbiological quality and shelf-life. Aspects considered include: effects of warm vacuum packaging vs. conventional treatment; effects of cooling at -2° or -11°C after packaging; effects of breaking the cold chain (holding for 2-3 h at ambient temp.); effects of permeability of the packaging film; and effects of packaging 4 carcasses/bag on development of the microflora. Numerous tables and graphs of results are given. The results show that warm vacuum packing gave lower total counts and psychrotroph counts than conventional treatment, but had little effect on coliform counts. Skin pH of vacuum-packaged samples declined more rapidly than that of control samples. Cooling conditions after vacuum packaging had little effect on bacteriological quality. During storage, *Pseudomonas* spp. tended to be replaced by psychrophilic Enterobacteriaceae. Permeability of the packaging material significantly influenced microbial growth. Packaging of carcasses in groups of 4 had no significant effect on the microflora. It is concluded that warm vacuum packaging may permit increased storage life of poultry carcasses. AJDW

115

[Mass occurrence of an 'ornithosis-like' disease in a poultry processing plant, Debrecen.]

Szalay, G.; Tanyi, J.

Baromfitenyeszet es Feldolgozas 27 (4) 167-170 (1980) [Hu] [Allategeszsegügyi Intezet, Debrecen, Hungary]

An outbreak of an ornithosis-like disease at a poultry-processing plant in Hungary affected several hundred workers in 1976-1978. Fungi were suspected to be the causative organisms; 86% of air samples studied contained fungi. The outbreak coincided with introduction of a new ventilation system; possible relation of introduction of this system to the relatively high level of fungal contamination of the air is discussed. Efficient daily cleaning and disinfection measures reduced air contamination (only 8-20% of samples containing fungi) and virtually eliminated the disease outbreak. ESK

116

H. C. Beales: new plant shows faith in duck market.  
Leith, W.

Frozen Foods 33 (3) 29, 34 (1980) [En]

The modern duck processing and freezing plant of H. C. Beales & Co., Norwich, is described. At present the production is 1 million ducks/yr, but with the new plant this will be increased to 25 million. AL

117

[Organochlorine hydrocarbons in raw materials and products of the poultry processing industry.]

Lukacka, J.; Lisa, V.

Hydinarsky Priemysel 22 (3/4) 102-114 (1980) [31 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Evaluation of various existing methods showed that the optimum extraction solvents were petroleum ether and acetone for samples of poultry fat and eggs resp. The main advantage of a newly developed method was the possibility of isolation, purification and detn. of HCB, HCH, and DDT residues from one extract. The determined values, given in tables, showed that the level of contamination was below the accurate limits of the detn. The main source of contamination was feedstuffs. STI

118

[Increased expansion in the range of smoked poultry meat products.]

Bobis, L.

Hydinarsky Priemysel 22 (3/4) 85-95 (1980) [Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

The large possibilities of new developments are discussed in the range of smoked poultry meat products, e.g. various types of soft, semi-dry and dry sausages, poultry meat ham, liver wurst, frankfurters, mortadella etc. Experience with the hitherto existing range of products has been successful, and consequently further new developments are proposed, especially utilization of other kinds of poultry and combinations with other kinds of meat such as pork, beef and game. STI

**119**

[Study on the possibility of CO<sub>2</sub>-snow cooling of poultry carcasses to be marketed under refrigerated conditions.]

Colin, P.; Lahellec, C.

*RTVA* 19 (160) 21-23, 25 (1980) [1 ref. Fr]

Trials on a pilot-scale tunnel (throughput 80 carcasses/h) for cooling poultry carcasses by means of CO<sub>2</sub>-snow are described. The tunnel has 2 sections: one at -50°C, the other at -25°C; carcasses spend 15 min in the former, 30 min in the latter section. Comparative tests were conducted on carcasses chilled in a CO<sub>2</sub>-snow tunnel, and in an air chiller. Data are presented for microbiological quality ≤ 9 days after chilling, and for temp. and wt. loss of the chilled carcasses. Little difference in microbiological quality was observed between carcasses chilled by the 2 methods. Carcass temp. complied with legal requirements. Wt losses were lower for CO<sub>2</sub>-snow chilling than for air chilling. AJDW

**120**

Apparatus for processing of poultry.

Messner, C. R. (Campbell Soup Co.)

*United States Patent* 4 245 372 (1981) [En]

Device is described for severing tails of poultry from the carcasses. When this device is utilized in automated poultry processing equipment, poultry is conveyed in conventional eviscerating shackles. These eviscerating shackles cooperate with a back up bar which rides against the eviscerating shackles and aids in delivery of the tail to the lead-in slot of the device's infeed guide. AS

**121**

[Experience of a Novosibirsk poultry combine on improvements in production organization. Study report. Series: Poultry processing industry.] Opyt raboty novosibirskogo ptitsekombinata po sovershenstvovaniyu organizatsii proizvodstva. Obzornaya informatsiya. Seriya: Ptitsepererabotovyayushchaya promyshlennost'. [Booklet]

Vodopyanov, A. M.

13pp. (1980) [Ru] Moscow, USSR;  
TSNIITElmyasomolprom. Price 0.11r

**122**

[Comparison of effect of various types of protein preparations on the quality of frankfurter-type poultry meat sausages.]

Nedeljkovic, L.; Kicec, N.; Stankovic, S.

*Tehnologija Mesa* 21 (2) 62-63 (1980) [5 ref. Sh, en]

The effect of protein preparations on frankfurters from poultry meat was studied. 4 types of product were studied: (i) poultry meat frankfurters free from emulsifier (control); (ii) with an addition of 1.85% sodium caseinate EM-6; (iii) with an addition of 1.85% Belvit S emulsifier and (iv) with an addition of 1.85% soy protein (Supro 500 E). The additions were made in

the cutter after processing the emulsion; the emulsion was then processed by the normal method. The best organoleptic properties were found in (ranking in the order given) frankfurters (iii), (i), (ii) and (iv). The effects of individual protein preparations are described in detail. STI

**123**

Ultrafiltration treatment of poultry processing wastewater and recovery of a nutritional by-product [for animal feed].

Shih, J. C. H.; Kozink, M. B.

*Poultry Science* 59 (2) 247-252 (1980) [12 ref. En] [Lab. of Applied Biochem., Dep. of Poultry Sci., N. Carolina State Univ., Raleigh, N. Carolina 27650, USA]

**124**

[Health diet based on poultry meat. Diabetes mellitus.] [Book]

Bobis, L.; Rudohradka, A.; Simonic, R. 293pp. (1980) [26 ref. Sk] Bratislava, Czechoslovakia, VUHP.

Chapters are: Significance of poultry meat in the diet of diabetics (pp. 5-10); Diabetes mellitus (pp. 11-76); Development of commercial production of poultry meat (pp. 77-95); Trends in the growth of poultry products consumption (pp. 96-98); Role of poultry meat in correct nutrition (pp. 99-155); Innovation trends in poultry meat processing (pp. 156-168); and Ready-to-serve poultry dishes (pp. 169-291). STI

**125**

[Food poisoning in communal catering. Account of 4 years of control.]

Guerin, M. S.; Luguet, F. M.; Goussault, B.; Billaux, F.

*Alimentation et la Vie* 68 (1) 22-29 (1980) [30 ref. Fr] [Inst. Sci. d'Hygiene Alimentaire, Rue de Chemin Blanc, BP 138, 91160 Longjumeau, France]

Results from 4 yr investigations into outbreaks of food poisoning in various catering establishments (restaurants, schools, hospitals) in the Paris region are reported. They included questionnaires to consumers, to kitchen staff, and bacteriological control data. Tabulated data showed that food poisoning was caused by meat products (14 cases), poultry (1 case) and pastry (1 case). The organisms responsible were staphylococci (3), *Clostridium perfringens* (13, all in meat and poultry products), and 3 unidentified. RM

**126**

[Handling of live poultry and poultry products.]

Hartmannova, J.; Jurackova, Z.; Bielesch, J.

*Hydinarsky Priemysel* 22 (9/10) 356-363 (1980) [174 ref. Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Modern handling methods are discussed, with reference to live poultry as well as slaughtered birds and their processing. Grading and weighing equipment, packaging equipment and chilling and freezing equipment are considered. STI

127

**Poultry killing method and machine.**

Sheehan, J. D.; Scheier, D. J. (Simon-Johnson Inc.)

**United States Patent** 4 249 285 (1981) [En]

In a machine for use in poultry processing plants, a succession of birds, suspended by their legs from an overhead conveyor, are advanced through a zone where each bird is separately handled and individually controlled; the neck is cut to sever  $\geq 1$  blood vessel, causing the bird to bleed to death, all without decapitation. AS

128

**Poultry carcass sorter.**

Autosystems Ltd.

**British Patent** 1 581 634 (1980) [En]

° Poultry carcass sorter and conveyor has a mechanism which runs adjacent to and in unison with containers for feeding carcasses to delivery stations according to wt. IFT

129

**Poultry carcass grading.**

Autosystems Ltd.

**British Patent** 1 581 635 (1980) [En]

Process is described in which poultry carcasses on a conveyor are associated with  $\geq 2$  grades by a sensor, the signals being used to control further processing. IFT

130

**[Poultry meat in rational nutrition.]** Hydina v racionalnej vyzive. [Book]

Malik, V.

202pp. (1980) [40 ref. Sk] Bratislava, Czechoslovakia; Priroda. Price 25.0Kcs

Chapters are: Our food from the viewpoint of public health (pp. 5-18); Poultry meat in balanced nutrition (pp. 19-31); Processed poultry and poultry products on the retail market (pp. 32-56); Poultry slaughtering and processing in the home (pp. 57-73); Culinary recipes and formulations (pp. 74-196); and Poultry meat preservation in the home (pp. 197-201). STI

131

**Grading apparatus.**

Brook, R. M.; Elliot, E. (Autosystems Ltd.)

**British Patent** 1 578 523 (1980) [En]

Poultry carcasses are advanced past a visual inspection station to allow an operator to examine 4 carcasses simultaneously, so allowing more time for grading. IFT

132

**Transporting and sorting poultry carcasses.**

Brook, R. M.; Elliot, E. (Autosystems Ltd.)

**British Patent** 1 578 524 (1980) [En]

Process is described in which poultry carcasses are 1st advanced by conveyor through a weighing station and then to a visual inspection station. Carcasses are then released at downstream stations into bins according to wt. and grade. IFT

133

**[Possibility of using tobacco seed in rations for laying hens.]**

Petrov, N.; Shabanov, D.

**Zivotnov'dni Nauki** 16 (6) 68-73 (1979) [3 ref. Bg, ru, en] [Vissz Selskostopanski Inst. 'V. Kolarov', Plovdiv, Bulgaria]

During 1974 and 1975, 4 experiments were carried out involving 475 laying hens of Leghorn, Leghorn x Stara Zagora Red, and New Hampshire breeds in which inclusion in ration of 5.4 or 8% tobacco seed was studied. Nicotine was not detected in meat or eggs of the hens given tobacco seeds, and it is considered that they can be safely used for human consumption. SKK

134

**[Postmortem changes in pH and colour of meat of geese slaughtered at different ages.]**

Pour, M.; Mikolasek, A.

**Zivocisna Vyroba** 25 (1) 13-21 (1980) [19 ref. Cs, ru, en, de] [Katedra Chovu Prasat & Drubeze, Vysoka Skola Zemedelska, 160 21 Prague-Suchdol, Czechoslovakia]

Groups of 10 Bohemian x Rhine crossbred geese, equal numbers of males and females, were slaughtered at ages of 9, 12 and 30 wk; pH<sub>1</sub>, pH<sub>2</sub> and pH<sub>3</sub> (15 and 60 min and 24 h resp. after slaughter), and colour 60 min and 24 h after slaughter measured using the Göfo photometer (Firma E Schütt jun., Göttingen, Federal Republic of Germany) were determined in samples of right *pectoralis superficialis* muscle kept at 2-6°C during the tests. Carcass wt. was also determined. Mean values with s.d. and significance of differences are tabulated for both sexes together and for male and females separately. pH<sub>1</sub> values (taken before scalding) increased overall with increase in age from 5.97 to 6.34 ( $P < 0.01$ ); at all ages, pH changes indicated end of glycolysis within 60 min of slaughter. Muscle colour intensity deepened with increase in age ( $P < 0.01$ ). It is concluded that, in both sexes, muscle pH and colour were objective indices of meat quality. SKK

135

**[Effect of environment on results of rearing of Italian and Landaise gosling broilers.]**

Resovsky, S.; Chrappa, V.; Grom, A.; Okal', A.

**Zivocisna Vyroba** 25 (8) 605-610 (1980) [9 ref. Sk, ru, en, de] [Vyskumny Ustav Chovu & Sl'achtenia Hydiny, 900 28 Ivanka pri Dunaji, Czechoslovakia]

Groups of (i) 28 Italian (I) and (ii) 32 Landaise (L) goslings; (iii) 30 I and (iv) 30 L goslings; and (v) 30 I and (vi) 30 L goslings were placed when 1-day-old, resp. for (i) and (ii) on litter in a wooden shed with access during the day to a grass run from the 8th day of life; for (iii) and (iv) in a shed on litter for the whole duration of the test; and for (v) and (vi) similarly in battery cages. (i)-(vi) received complete rations and water ad lib.; and (iii)-(vi) received in addition grit twice daily and young grass ad lib. All groups were slaughtered at 9 wk of age. Mean live wt. values at 1 and 63 days of age are tabulated for males and females separately and overall in each group; mean slaughter values are tabulated for 5 males and 5 females in each group. Against a background of overall slaughter wt. of resp. 3910, 3910 and 3760 g for (i), (iii) and (v), and 4165, 4395 and 4082 for (ii), (iv) and (vi), the corresponding slaughter yields were 68.7, 69.0, 69.1, 70.1, 69.3 and 70.2%. In general, males showed better slaughter yields than females. SKK

## 136

Slaughter values of geese in some fattening categories.]

Hrouz, J.

*Zivocisna Vyroba* 25 (8) 597-603 (1980) [20 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, 662 65 Brno, Czechoslovakia]

(i) and (ii) 2 groups of Czech/Italian broiler geese fed on 2 different broiler rations, (iii) a group of geese for roasting (with different proportions of Italian blood) given for 28 days a feed supplement of maize/oats mixture; (iv) a group of fatty-liver geese of Rhine x Landaise cross force-fed for 21 days from 105-110 days of age with prepared maize; (v) a group of laying geese culled after the 3rd yr of lay; and (vi) like (v) but given a supplement of maize meal and oats for 34 days were used in these tests. In all groups (sizes not stated), there were equal numbers of males and females. (i)-(vi) were slaughtered at mean live wt. of 4070, 4410, 6820, 7850, 5766 and 7087 g resp. Mean values with s.e. tabulated for characteristics of the carcasses included for (i)-(vi) resp.: slaughter yield,  $70.36 \pm 0.82$ ,  $76.13 \pm 0.74$ ,  $77.21 \pm 0.93$ ,  $76.19 \pm 0.47$ ,  $74.76 \pm 1.02$ , and  $77.10 \pm 1.18\%$ ; yield of edible offal as % live wt., 14.5, 17.1, 17.6, 23.4, 10.5 and 15.9; eviscerated carcass wt. as % live wt.,  $55.86 \pm 0.73$ ,  $58.99 \pm 0.76$ ,  $59.61 \pm 0.84$ ,  $52.83 \pm 0.80$ ,  $64.27 \pm 1.21$ , and  $61.18 \pm 1.89$ . Differences in slaughter yield were not significant, but the other 2 characteristics quoted are considered useful in evaluation of fattening category. SKK

## 137

[Canned poultry meat production.]

QP Corp.

*Japanese Examined Patent* 5 542 609 (1980) [Ja]

Process is described in which bones are removed from cooked poultry meat, the resultant product then being immersed in a solution of polyphosphate and protease. IFT

## 138

Use of certain proteolytic enzymes in certain meat and poultry products.

United States of America, Food Safety & Quality Service

*Federal Register* 45 (174, Sept. 5) 58815-58820 (1980) [En] [Washington, DC, USA]

The Federal meat and poultry regulations are amended to permit the use of *Aspergillus oryzae*, *Asp. flavus oryzae* group, bromelin, ficin and papain as proteolytic enzymes to tenderize the muscle tissues of all cuts of meat and mature poultry. CAS

## 139

[Meat hygiene legislation, 26th Supplement (November 1980).] Fleischhygienerecht.

26. Ergänzungslieferung (Stand November 1980).

[Booklet]

Dutschke, G.

226pp. (1980) [De] Berlin; Paul Parey Price DM114.00

This 26th supplement to this loose-leaf compilation

of legislation for meat in the Federal Republic of Germany brings the compilation up to date as of Nov. 1980. Aspects covered include: the Meat Inspection Law; the Law for Amendment of the Meat Inspection Law and the Poultry Meat Hygiene Law; the EEC Directive on Intra-Community Trade in Fresh Meat; Approved Inspection Stations for imported meat; the Ordinance on Meat Conditionally Acceptable for Human Consumption; the EEC Directive on Fresh Poultry Meat; the EEC Directive on Moisture in Frozen Poultry; the EEC Directive on Labelling of Bulk-packaged Fresh Poultry Meat; and the Poultry Meat Hygiene Law. [See FSTA (1978) 10 12U1269 for 23rd supplement] AJDW

## 140

[Study of the chilling of fish in an environment with varying temperature.]

Golikov, F. D.; Abdul'manov, Kh. A.; Maruseitsev, Yu. D.

*Rybnoe Khozyaistvo* No. 4, 75-76 (1980) [Ru]

[Astrakhanskii Tekh. Inst. Rybnoi Promyshlennosti i Khozyaistva, Astrakhan, USSR]

A method to determine chilling rate in an environment with a regularly varying temp. until a quasi-stationary state of the system occurs was worked out. Data on analytical and experimental validations of the method and fields of application are presented. The method can be used for freeze-drying of poultry, and for fish processed in a liquid environment; applicability of the method is wide and the experimental technique is considerably simplified. STI

## 141

[Choline contents of poultry products and rabbit meat.]

Gavrikova, I. P.; Khlevovaya, V. V.

*Voprosy Pitaniya* No. 2, 69-70 (1980) [4 ref. Ru]

[Nauchno-proizvodstvennoe Ob"edinenie 'Kompleks', Moscow, USSR]

The choline content of various foods were determined using the Engl' photometric method [see *Metody opredeleniya Vitaminov v Kormakh* (1967), pp. 201-206]. Choline contents (mg/100 g edible part) were: White Leghorn hen,  $75.7 \pm 0.755$ ; White Plymouth Rock broiler,  $111 \pm 310$ ; Landanskii goose,  $58.3 \pm 1.200$ ; White Peking duck,  $119 \pm 0.800$ ; Japanese or Faraon quail, from  $150 \pm 0.922$  to  $151 \pm 2.77$ ; White Moscow turkey,  $133 \pm 1.750$ ; 'chicken in its own juice' preserves,  $48.3 \pm 1.010$ ; 'duck in its own juice' preserves,  $99.3 \pm 0.180$ ; White Leghorn hen's whole egg,  $252 \pm 1.150$ ; Japanese quail whole egg,  $496 \pm 2.730$ ; Faraon quail whole egg,  $519 \pm 0.464$ ; Soviet Chinchilla rabbit,  $116 \pm 0.100$ ; and White New Zealand rabbit,  $116 \pm 0.592$ . RAW

## 142

Frozen storage of poultry - a review. [Review]

Pandey, N. K.

*Indian Food Packer* 34 (6) 39-43 (1980) [43 ref. En]

[Poultry Res. Div., Indian Vet. Res. Inst., Izatnagar - 243 122, India]

This review covers the following aspects: various freezing methods; rate of freezing and location of ice formation; prefreezing treatments; effects of different packaging materials; frozen storage effects; and effects of thawing. CFTRI

## 143

**Composition of foods. Sausages and luncheon meats - raw, processed, prepared.** [Book]

Richardson, M.; Posati, L. P.; Anderson, B. A.  
*United States Department of Agriculture,*

*Agriculture Handbook* no. 7-8, vi + 92pp. (1980)

[14 ref. En] [SEA, USDA, Washington DC, 20402, USA]

This publication is a major revision of the 1963 edition of USDA Agriculture Handbook No. 8, "Composition of foods, raw, processed, prepared", intended to replace previous food composition data and to serve as a standard reference. The nutrient composition of 80 items (66 meat products and 14 poultry products) is tabulated, 1 item/page. Data (wt/100 g edible portion) are presented for proximate composition, minerals, vitamins, lipids and amino acids. RM

## 144

**[Fatty acid composition of lipids in the soft by-products of poultry.]**

Khlevovaya, V. V.; Savran, E. G.

*Voprosy Pitaniya* No. 3, 67-71 (1980) [2 ref. Ru]

[Nauchno-proizvodstvennoe Ob'edinenie  
Pitsepererabatyayushchei i Kleezhelatinovoi  
Promyshlennosti 'Kompleks', USSR]

TLC was used to determine the fatty acid composition of lipids in the liver, heart and of adult and young geese, turkeys, chickens and ducks. Data are tabulated on total lipids and contents of 37 individual fatty acids; total lipid in the liver was 5.0, 4.9, 4.7 and 10.0% in fully grown geese, turkeys, chickens and ducks, resp. RAW.

## 145

**Poultry gizzard processing system.**

Graham, K. Z.; Graham, J. R.

*United States Patent* 4 249 284 (1981) [En]

In this process, a rotary cutting disc severs the entrails from the poultry gizzards, and a 2nd rotary cutting disc splits the gizzards. The split gizzards then move up on and over helical cleaning wheels which further separate the cut-apart portions of the gizzards for water spray removal of particles from the gizzards. The gizzards are then discharged to a peeling mechanism where their outer cover is pulled off. AS

## 146

**[Technological properties of duck meat.]**

Niewiarowicz, A.; Trojan, M.; Pikul, J.; Przymuszala, K.  
*Przemysl Spozywczy* 34 (1) 29-30 (1980) [13 ref. Pl, en, ru, de, fr] [Inst. Tech. Zywnosci Pochodzenia Zwierzecego, AR-Poznan, Poland]

The pH of pectoral muscles of 350 broiler ducks ranged from 5.7 to 6.7, 22 min after slaughter, approx. 53% of the values being in the range 6.1-6.3; values of 5.7-5.8 were associated with the PSE defect, and 6.6-6.7 with the DFD defect (approx. 5 and 8% of samples,

resp.). 3 groups, each of 16 ducks, were sorted out according to pH, viz. 5.7-5.8, 6.0-6.1 and 6.6-6.7; contents of free moisture, moisture release, water binding capacity and emulsion stability (tabulated) were determined for breast and thigh muscles in the fresh state and after 4 months frozen storage. Generally speaking, these parameters (reflecting the technological properties of the meat) were better than in the case of broiler chickens. There was a substantial drop in meat quality after 4 months frozen storage. HBr

## 147

**[Detection of use of n-alkanes in animal feeds by analysis of products of animal origin.]**

Boniforti, L.; Vincenzi, M. de; Silano, V.

*Annali dell'Istituto Superiore di Sanita* 15 (3) 587-593 (1979) [8 ref. It] [Lab. di Tossicologia, Istituto Superiore di Sanita, Rome, Italy]

The potential for detection of use of feeds containing yeast cultured on n-alkanes is discussed, with reference to effects on the hydrocarbon content, fatty acid composition and <sup>14</sup>C level in tissues. Tables of data are included for the hydrocarbon content of Toprina yeast biomass, tissues of swine fed diets with 0-30% Toprina, and imported meat and poultry products; and for the fatty acid compositions of tissues of pigs and poultry fed diets containing Toprina. AJDW

## 148

**Reducing electric power demand in poultry processing plants.**

Whitehead, W. K.; Shupe, W. L.

*ASAE Paper* No. 79-6507, 14pp. (1979) [5 ref. En]

[Environmental Eng. Lab., Richard B. Russell Agric. Res. Cent., USDA, PO Box 5677, Athens, Georgia 30604, USA]

The potential for reduction of the electrical energy consumption in processing of broilers is discussed, with reference to energy audits for 3 poultry processing plants (capacities 8000 birds/h on 1 shift; 13 500-15 000 birds/h on 1 shift; and 12 500 birds/h for 2 shifts, resp.) in 1977-1978. Energy consumptions of ventilation fans for cooling of live broilers and of ice-making facilities at these 3 plants are considered, with reference to potential methods for energy economy and their effects on total energy use and costs. An electric hot water supply system using off-peak power is briefly described, with special reference to advantages over natural gas supplies subject to interruption in times of shortage. AJDW

## 149

**[Effect of crossing Pomeranian and White Italian breeds of geese on muscle pH changes, tenderness, thermal drip and colour in 12-week-old geese.]**

Karasinski, D.; Trojan, M.; Pikul, J.

*Roczniki Akademii Rolniczej w Poznaniu* No. 94

(Zootechnika 23) 127-139 (1977) [10 ref. Pl, en, ru] [Inst. Hodowl i Tech. Produkcji Zwierzecej, AR, Poznan, Poland]

160 goslings of Pomeranian and White Italian breeds and their crosses were studied. In breast and leg muscles, pH was measured 25 min (pH<sub>25</sub>) and 24 h (pH<sub>24</sub>) after slaughter. Tenderness (Warner-Bratzler shear) and

thermal drip were determined in breast muscles of 65 birds. Breast muscle colour was estimated in 76 goslings with the Momcolor apparatus determining only colour lightness. pH in breast muscles was significantly lower than that in leg muscles. The determined pH values did not show the traits of watery meat. Significantly higher values of  $pH_{24}$  in breast and leg muscles were found in the females. Significant breed differences were found in the muscle pH values. Breast muscle colour in Pomeranian breed and crosses was much better than that in White Italian geese. In the Pomeranian  $\times$  White Italian hybrids an improvement important from the point of view of technology was observed in the meat properties i.e. tenderness and thermal drip. These findings indicate a beneficial effect of heterosis. AS

## 150

### Device for modelling or packing an object.

Brummelen, J. van (Moba Holding Barneveld BV)  
*United States Patent* 4 257 141 (1981) [En]

Device is described for the modelling and packing of an object e.g. poultry, the device having a container which closes, enclosing the object, and driving means for the closing movement of the container. The driving means contains elastic elements which permit the container to close less than completely if the object is too big. AS

## 151

### Soya products in meat, poultry and seafood. [Lecture]

Waggle, D. H.; Decker, C. D.; Kolar, C. W.

*Journal of the American Oil Chemists' Society* 58 (3) 341-343 (1981) [24 ref. En] [Ralston Purina Co., Checkerboard Square, St. Louis, Missouri 63188, USA]

The function of soy protein products in several processed meat, poultry and seafood products is discussed. Soy protein can now be used to contribute certain characteristics to these products, and not merely extend them (texture formation, gelation, fat and water binding, and emulsification are such characteristics), and the list of applications is expanding constantly as further technological and agricultural developments are made. Maintenance of traditional quality in reformulated products is considered. [See FSTA (1981) 13 12J1852.] LH

## 152

### Kibbutz slaughter is different.

Haffert, W.

*Poultry International* 20 (2) 72, 74, 76, 97, 98 (1981) [En, de, fr, es, it, ja, ar]

A brief description is given of the Of Kor poultry processing plant at Ashkelon, Israel. Aspects considered include catching and loading of chickens, ritual slaughter, separation of birds with physical defects, bleeding of the slaughtered chickens, cold water spraying of the carcasses before plucking, dry-salting for 1 h, rinsing, weighing, packaging and refrigeration. AJDW

## 153

### [Waste-water treatment in the poultry industry.]

Erdesz, S.

*Baromfitenyesztes es Feldolgozas* 27 (1) 8-14 (1981) [Hu] [Baromfiipari Kutato Lab., Budapest, Hungary]

In the poultry industry, waste-water pollution problems can be reduced significantly by the following

technological modifications: blood collection in a closed system; pneumatic transport of offals, head, legs and necks; utilization of offals in situ; water removal from offals; use of waste water for feather transport; careful sedimentation; and filtration of the effluent. ESK

## 154

### Device for handling objects.

Ginkel, M. van; Plug, J. (Moba Holding Barneveld BV)  
*United States Patent* 4 255 832 (1981) [En]

A device for handling objects, e.g. poultry has an attaching means for receiving the objects and has 1 or a pair of feelers located in the region of the attaching means which moves between a 1st position where normal operation of the device is prevented and a 2nd position where normal operation of the device is permitted, movement to the 2nd position being caused by an object in the attaching means. The attaching means may include a pair of slots for receiving a pair of poultry knee-joints; the absence of either knee-joint from its respective slot will allow its respective feeler to move to its 1st position. AS

## 155

### Modelling apparatus for poultry

Ginkel, M. van; Plug, J. (Moba Holding Barneveld BV)  
*United States Patent* 4 255 831 (1981) [En]

A device for shaping poultry has pivotably interconnected shell members and flaps for catching the wings of the poultry; the wings are changed from an open or spread-out position towards a position in which their ends nearly engage each other, so that the wings are guided and laid against the body of the poultry before the shell members of the modelling apparatus close. AS

## 156

### Opening apparatus for poultry carcasses.

Hathorn, J. L.; Scheier, D. J. (Gordon Johnson Co.)  
*United States Patent* 4 257 142 (1981) [En]

In this device, a bird is gripped by its thighs adjacent to the vent hole and is shifted toward a knife until the hole has reached a predetermined location that corresponds to a certain depth of insertion of the knife into the hole. Operation of the knife once fully inserted causes the skin to be slit between the hole and the keel bone, thus making an enlarged opening to the body cavity. AS

157

**Chemical and biological treatment of poultry processing sludge.**

Ritter, W. F.; Eastburn, R. P.

**ASAE Paper No. 80-6002, 25pp. (1980) [14 ref. En]**  
[Agric. Eng. Dep., Univ. of Delaware, Newark, Delaware 19711, USA]

158

**[Weight and chemical composition of livers of geese during fattening.]**

Georgiev, L.; Kostadinov, K.; Anastasov, A.

**Veterinarnomeditsinski Nauki** 17 (4) 65-69 (1980)  
[15 ref. Bg, ru, en] [Vissch Inst. po Zootekh. & Vet. Med., Stara Zagora, Bulgaria]

A batch of 65 local white Benkov geese of equal age (4 months) and live wt. (4 kg) were fattened under uniform conditions, and groups of 5 were slaughtered initially, on the 5th, 10th, 15th, 20th and 25th days of fattening, and after completion of fattening at 33 days. Mean values are tabulated for liver wt. and contents of moisture, DM, and total lipids at each slaughter date. Against a background of initial and final liver wt. of 100 and 463 g resp., moisture content decreased progressively from 68.49 to 35.84%, and lipid content increased progressively from 2.47 to 46.97%. Tabulated GLC values for constituent fatty acids show the following initial and final % values: C14, 1.73 and 4.59 (sharp rise in last measurement); C16, 36.7 and 13.9 (sharp drop in last measurement); C18, 25.8 and 16.6 (decline throughout); C18:1, 27.9 and 50.7 (steady increase); C18:2, 7.4 and 1.74 (decrease after 10th day); and C 20, 0 and 1.70 (detected only after the 20th day). SKK

159

**[Comparative biological value of canned poultry meat pastes with the addition of proteins.]**

Seredenko, L. D.; Gonotskii, V. A.; Khovaeva, L. A.

**Myasnaya Industriya SSSR** No. 9, 33-35 (1980) [7 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsopererabaty-vayushchei i Kleezhelatunovoi Promyshlennosti Kompleks, USSR]

Use of milk and soy proteins in the manufacture of canned pastes was investigated and the most favourable additions ensuring high quality of the finished products were established. Canned pastes were manufactured from poultry meat with addition of milk proteins and soy proteins. In the 1st alternative, part of the poultry meat was substituted by milk proteins at 2.5, 5, 7.5 and 10%; in the 2nd, milk and soy proteins were used in the ratio of 30:70, 50:50 and 70:30. Pastes with addition of milk and soy proteins in the ratio of 70:30 had the best organoleptic properties. Poultry meat pastes may be enriched by 5% protein concentrates (milk and soy proteins). STI

160

**Poultry decapitating apparatus.**

Lewis, E. J.

**United States Patent 4 257 143 (1981) [En]**

In an apparatus for removing the heads of poultry the birds are supported by their feet connected to an overhead conveyor and are delivered, so that their heads pass below a neck engaging channel through which the necks pass, and moved into line with a rotary cutter blade. AS

161

**[Survey of modern poultry slaughtering and processing lines from the viewpoint of sanitation.]**

Isakov, M.

**Tehnologija Mesa** 21 (4) 115-122 (1980) [11 ref. Sh, en]  
[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Veterinary hygiene control at poultry slaughtering plants is described, with reference to inspection of poultry to be slaughtered, poultry slaughtering and processing lines, general aspects of hygiene and sanitation, process control and equipment. Sanitation and hygiene at poultry processing plants abroad is discussed, and all 25 poultry processing plants in Yugoslavia are listed, with their full name, address and output. STI

162

**[Meat quality of dressed poultry under different methods of transportation.]**

Mitsyk, V. E.; Gabbasova, L. B.; Shaptala, R. D.; Bugrova, L. P.; Vorontsova, T. M.

**Tovarovedenie** 13, 31-34 (1980) [2 ref. Ru]

Carcass quality of ducks transported in (i) containers (capacity 12 crates) or (ii) the traditional method [not defined], was investigated; the carcasses were stored for 24 h at either 18-25°C or -11° to -22°C in each case. The sample to be tested comprised a minced mixture of 3 samples from 3 different carcasses. Data are tabulated on carcass meat quality characteristics, covering moisture (%), loosely bound moisture (%), free amino N (mg%), volatile fatty acids (ml 0.2 NaOH), pH, and acid number (mg) and peroxide value (%) of the fat; the microbiological composition of the dressed carcasses is also tabulated. All carcasses were fresh (positive reaction to ammonia). At the higher temp., moisture and loosely bound moisture decreased from 79.9 and 31.7 resp. in controls (before transportation), to 79.9 and 30.3 in (i), and to 77.4 and 28.8, resp. in (ii). All other quality parameters increased, the increase being greatest in (ii). At the lower temp., quality changes were insignificant: total moisture was 0.8 and 2.3% less in (i) and (ii), resp. than in controls. Microflora growth was 2.5-4 x slower in muscles of (i) than (ii); no pathogenic microorganisms were detected. Container transportation is therefore advocated for maintaining product quality. RAW

## 163

[Electrical stunning of slaughter poultry.]

Betrachtungen zur elektrischen Betäubung des  
Geflügels bei der Schlachtung.

Jaksch, W.

*Wiener Tierärztliche Monatsschrift* 67 (3) 77-80, 82-  
84, 86-91; (11) 321-324, 326-337 (1980) [39 ref. De, en]

[Vet. Med. Univ. Wien, Linke Bahngasse 11,  
A-1030 Vienna, Austria]

Present methods of electrical stunning used in poultry  
slaughter are discussed from the point of view of  
prevention of cruelty to animals, including experimental  
results and data from an extensive literature survey. If  
slaughter is performed by a cut through the spinal cord,  
the method meets present legal requirements in most  
countries. AS

## 164

[Plucking element for a device for plucking poultry.]

Stork PMT BV

*Netherlands Patent Application* 7 903 737 (1980) [NI]

A cup-shaped carrier is rotary driven around its  
centre line and the casing and head surfaces have  
plucking fingers. The casing surface is a truncated cone  
surface and the head surface is essentially transverse to  
the axis of rotation. W&Co

## 165

A comparison of fresh and frozen poultry.

Baker, R. C.; Darfler, J. M.

*Journal of the American Dietetic Association* 78 (4)  
348-351 (1981) [8 ref. En] [Dep. of Poultry Sci., Cornell  
Univ., Ithaca, New York 14850, USA]

Investigations were carried out into the effect of  
freezing on the quality of poultry (ducks, turkeys and  
broiler and roaster chickens) roasted and evaluated by  
sensory tests, shear press values, and expressible fluid  
detn. The samples were evaluated using the triangle  
test. Results showed that the taste panel could not  
significantly distinguish between fresh and frozen  
thawed paired halves of roast poultry. Objective testing  
by shearing and expressible moisture losses also failed  
to show a significant difference. Of those judges who  
could distinguish between the fresh and frozen thawed  
samples, the greater % preferred the fresh samples.

VJG

## 166

[Method of test for dry salted duck.]

Taiwan, National Bureau of Standards

*Chinese National Standard CNS N6040*, 1p. (1979)  
[Ch]

## 167

Method of test for frozen poultry.

Taiwan, National Bureau of Standards

*Chinese National Standard CNS N6096*, 3pp. (1976)  
[En]



# CHICKENS

1

## **Chilling apparatus for broiler carcasses.**

Masuda, K.; Okada, F.; Nishioka, Y. (Daikin Kogyo Co. Ltd.; Daikin Plant Co. Ltd.; Ijichi Shukeijo Co. Ltd.)  
**United States Patent 4 199 958 (1980) [En]**

Chilling apparatus for broiler carcasses comprises a chilling room, a conveyor for continuously conveying the carcasses, an air chilling unit for feeding cold air to chill the carcasses in the process of conveyance, and a device for spraying water onto the carcasses during the process of conveyance and chilling, whereby the surfaces of the carcasses are moistened by the water spray and then chilled by cold air. AS

2

## [Studies on consumer consciousness and behaviour in relation to animal products. III. Investigation on consumption of chicken meat]

Nagano, M.; Nishino, M.

*Bulletin of the College of Agriculture and Veterinary Medicine, Nihon University [Nihon Daigaku Nojoigakubu Gakujutsu Kenkyu Hokuoku] 37 (55) 204-213 (1979) [23 ref. Ja, en] [Lab. Management of Anim. Ind., Coll. Agric. & Vet. Med., Nihon Univ., Tokyo, Japan]*

A survey was conducted in August 1977, involving 1197 housewives in 25 districts of Tokyo and Chiba and Kanagawa prefectures, to evaluate consumption of and attitudes to chicken meat. Tables of data are given for: demographic characteristics of the population studied; chicken meat consumption; degree to which chicken meat is liked by the housewife and the whole family; the person who likes chicken meat most in the family, and their age; frequency of purchase of chicken meat; quantity purchased at any one time; part of chicken purchased; preference for whole chickens vs. cuts; cooking method; type of meal in which chicken meat is served (Japanese, Chinese or Western); and future intentions in relation to chicken consumption. The results are discussed in detail. Overall, a moderate increase in per capita consumption of chicken meat is likely. [From En summ.] AJDW

3

## **Studies on the enterotoxigenicity of environmental *Escherichia coli*, belonging to serotypes normally considered enterotoxigenic.**

Bettelheim, K. A.; Wilson, M. W.; Shooter, R. A.; O'Farrell, S. M.  
*Journal of Hygiene* 84 (3) 411-414 (1980) [12 ref. En]  
 [Nat. Health Inst., Dep. of Health, PO Box 7126, Wellington South, New Zealand]

15 strains of *E. coli*, isolated from chicken meat (7 strains) and other environmental samples, and belonging to serotypes normally considered enterotoxigenic, were studied for production of heat labile and heat stable enterotoxins. None of the chicken strains (belonging to serotypes 0.6.II/6, 0.6.H- and R.H16) produced either type of enterotoxin, 1 environmental strain produced heat labile enterotoxin and 1 was weakly positive in the heat stable enterotoxin assay. DH

4

## [Composition of lipids in milk products, vegetable oils and some commercial baby foods.]

Miric, M.; Lalic, Z.

*Hrana i Ishrana* 20 (7/10) 453-464 (1979) [17 ref. Sh, en] [Farmaceutskog Fak. Belgrade, Yugoslavia]

Fatty acid composition of milk, dairy products (pasteurized milk, sterilized milk, cultured milk, yoghurt, Processed cheese) and human milk and goats' milk as well as of infant formulae was investigated. In the preparations Humana 0, 1 and 2, Bebeiron 75 and S-26,

>5% of total energy was provided by linoleic acid, while this acid provided 3% of total energy in Nektarmil 1 and 2 and >10% in Similac.

Tocopherol/linoleic acid ratio was satisfactory in all products. Of 8 vegetable oils examined, 1 contained 16% erucic acid; chicken fat contained 19% linoleic acid. IN

5

## **Effect of aureomycin and terramycin on the live performance: processing losses and meat yield in broiler birds.**

Basheer, K.; Haleem, M. A.; Syed Mohiyuddin; Seshadri, S. J.

*Mysore Journal of Agricultural Sciences* 11 (2) 229-235 (1977) [10 ref. En] [Dep. of Vet. Path., Vet. Coll., Hebbal, Bangalore-560024, India]

250 Arbor Age broiler chicks (1 day of age at the start of the trial) were used in an investigation on effects of supplementation of the diet with (i) 10 g aureomycin/t, (ii) 20 g aureomycin/t, (iii) 10 g terramycin/t or (iv) 20 g terramycin/t on performance and carcass quality. A control group received a diet without antibiotic supplement. Groups of both male and female broilers were slaughtered at 8, 10 or 12 wk of age, and wt. gain, feed conversion and carcass quality were investigated. Tables of results are given, including data for bleeding %, dressing %, evisceration %, chilling gain %, giblet %, and neck %. No significant effect of dietary antibiotics on the carcass characteristics studied were observed, except that male (i)-(iv) birds slaughtered at 12 wk of age had significantly lower % neck than control birds slaughtered at this age. AJDW

6

## **[Use of L-lysine in chicken feed.]**

Gngoriev, N. G.; Orlov, L. V.; Sychov, A. L.; Buiynin, V. I.  
*Khimika v Sel'skom Khozyaistve* 16 (7) 41-43 (1978)  
 [7 ref. Ru]

Chickens fed 0.3% L-lysine supplement (commercial or synthetic) or no lysine supplement were weighed at 10 day intervals and chemical composition (DM, mineral and organic substances, lipids, protein level) of the carcass was determined on 10, 30, 56 day old chicks; wt. increase and calorie contents are also given. Max. protein concn. were recorded in meat from chickens receiving the L-lysine supplements. No significant differences were recorded between groups fed the 2 forms of lysine. RAW

7

[Lysine application in feed of chicks of laying breeds.]

Suprunov, O. V.

*Khimiya v Sel'skom Khozyaistve* 16 (5) 64-65 (1978)  
[5 ref. Ru][Murmanskaya Olenyevodcheskaya Opytnaya Stantsiya. Murmansk, USSR]

Effects of lysine in 3 groups of 1 day-old chicks were investigated. Lysine (1.0%) was administered in 2 diets: (i) with fish meal (8.5% total feed); (ii) with fish meal (3%) + lysine hydrochloride (0.8%); and (iii) as (ii), but with no supplement i.e. with lysine deficit. Chemical compositions of 30 day old chicken carcasses (DM, protein, fat, ash and energy contents) are tabulated. Results for groups (i) and (ii) were similar: (iii) led to slightly increased DM and fat contents. RAW

8

Effects of ochratoxin A on growth response and residues in broilers.

Prior, M. G.; O'Neil, J. B.; Sisodia, C. S.

*Poultry Science* 59 (6) 1254-1257 (1980) [14 ref. En]

[Anim. Path. Div., Food Production & Inspection Branch, Agric. Canada, Saskatchewan Area Lab., Saskatoon, Saskatchewan, Canada S7N 2R3]

The effects of continuous feeding of graded levels (0.5, 1.0, 2.0 p.p.m.) of ochratoxin A (OA) for 8 wk to male and female broiler chickens were investigated. A depression in body wt. gain was observed in all groups receiving OA. The depression was proportional to the level of exposure to OA, and was more marked and prolonged in males than in females. Detectable residues of OA were observed in the liver and kidney of birds fed 2 p.p.m. OA. Residues disappeared from liver within 24 h and from kidney within 48 h after withdrawal of the mycotoxin from feed. No residues of OA were found in muscle or fat. AS

9

[Body composition of laying hens receiving various energy and protein allowances.]

Körperzusammensetzung von Legehennen bei unterschiedlicher Energie- und Proteinversorgung.  
Kirchgessner, M.; Voréck, O.

*Archiv für Geflügelkunde* 44 (2) 71-78 (1980) [15 ref. De, en, fr, ru][Inst. für Ernährungsphysiologie, Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

96 HNL laying hens were used in a 40-day study on effects of daily allowances of metabolizable energy (930, 1100, 1270 or 1440 kJ) and crude protein (14.3, 17.6, 21.2 or 24.5 g) on the body wt. and body composition (DM, fat, protein, energy). Tables of results are given. Dietary energy allowance level significantly influenced all the carcass composition variables studied; dietary protein allowance did not significantly affect carcass composition. Correlation and regression analyses of the relationship between body wt. and composition and between individual constituents are presented. The results show that body composition cannot be predicted with acceptable accuracy on the basis of live wt alone: COMPOSITION MAY HOWEVER BE RELATED TO THE

10

The effect of a short-term heat stress or feed restriction on body weight, subsequent laying performance and body composition of pullets.

Kampen, M. van

*Archiv für Geflügelkunde* 44 (3) 124-128 (1980)  
[16 ref. En, de, fr, ru][Vakgroep Vet. Fysiologie, Utrecht, Netherlands]

3 groups, each of 26 Shaver 288 single comb White Leghorn birds, were used in an 80 wk experiment: group (i) was subjected to heat stress at 36°C at 4-5 wk of age, and fed ad lib. throughout the trial; group (ii) was not subjected to heat stress, but received a restricted diet at 4-5 wk of age to give growth retardation equal to that for (i); and group (iii) was a control, subject to neither heat stress nor feed restriction. Tables of data are given for growth, laying performance, egg quality and carcass composition. The results show that (i) and (ii) gave smaller eggs and a higher % cracked eggs than (iii). Treatment effects on carcass composition were fairly small, although (i) tended to have lower DM, total body fat and fat pad % than the other 2 groups; (iii) tended to have higher values than (ii) for these carcass constituents. Regression equations for prediction of % fat and % protein in the carcass are presented. AJDW

11

[Studies on natural flavouring substances. V. Enzymic hydrolysis of chicken bone protein and flavour of the hydrolysates.]

Ishida, K.; Kaji, Y.; Yamamoto, A.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 26 (4) 168-174 (1979) [Ja, en][Food Tech. Dev. Lab. Tsuchiura Plant, Kyowa Hakko Kogyo Co. Ltd. Amimachi, Ibaraki-ken, Japan]

In order to produce excellent flavouring substances from chicken bone protein by enzymic hydrolysis, the hydrolytic features, the flavours of hydrolysates and the properties of insoluble fractions after proteolysis were investigated. Of the chicken bone protein fractions, sarcoplasmic protein fraction (26% of total protein) could be easily hydrolysed by endopeptidase preparations and the hydrolysates were palatable without significant bitterness, while the hydrolysates from myofibrillar protein fraction (10%) had a strong bitter taste. As the stroma fraction (56%) could not be hydrolysed, taste of the hydrolysates was generally weak, although the hydrolytic ratio was increased by heat treatment at 95°C. The combined use of an endopeptidase and an exopeptidase, a flavouring substance was obtained in high yield from the heat-denatured chicken bone protein. Its main component was peptides, of which mol. wt. was lower than 5000, and the taste of the hydrolysates was slightly bitter. But the bitter taste almost disappeared by blending with hydrolysed vegetable protein (HVP). It was presumed that the insoluble fraction which remained after enzymic hydrolysis was a complex of lipids and such proteins as keratin or elastin. AS

12

**Investigations on the origin of two radiation-induced compounds in irradiated meat.**

Partmann, W.; Schlaszus, H.

*Zeitschrift für Lebensmittel-Untersuchung und Forschung* 171 (1) 1-4 (1980) [5 ref. En. de] [Fed. Res. Cent. for Nutr., Engesser Strasse 20, D-7500 Karlsruhe 1, Federal Republic of Germany]

Irradiation of muscle tissues of warm-blooded animals (cattle, pig, chicken) produced a new ninhydrin-positive substance (Y) in the region of the basic amino acids. Carp meat irradiated under similar conditions produced a new basic compound X; origins of these compounds were studied by irradiating solutions approximating the pools of ninhydrin-positive compounds in muscles. Irradiation of a standard solution of amino acids (10 Mrad) produced no X or Y, but addition of carnosine before irradiation produced Y. Irradiated solutions of carnosine or anserine (a related dipeptide occurring in chicken white breast muscle) produced Y. Carp muscle contains no carnosine or anserine. Irradiated solutions of histidine produced X; X was found to be unstable at alkaline pH, but quite stable at acid pH, such as those found in non-spoilt meat. Acid hydrolysis of irradiated carnosine or anserine solutions, or of irradiated extracts of warm blooded animal muscles, also produced compound X. Further studies on the chemical nature of X and Y require larger amounts of material. DIH

13

**Reduction of sodium nitrate and nitrite during curing and smoking poultry meat.**

Singh, R. P.; Mahadevan, T. D.

*Indian Journal of Poultry Science* 14 (4) 181-184 (1979) [10 ref. En] [Div. of Poultry Res., Indian Vet. Res. Inst., Izatnagar-243 122, India]

Dressed, cut-up chicken was cured for 72 h at 5-6°C (RH 80-85%), and smoked in hardwood smoke for 4 h at 40-45°C (RH 25-30%); it was then stored at room temp. (25-26°C) and under refrigeration (5-6°C). On the 4th day of storage, nitrite content was found to have increased significantly in all the treatments, the increase being greatest under refrigerated storage. On the 8th day of storage, a significant decrease in nitrite content was observed both before and after cooking, the loss being greater in the samples stored at room temp. The cured and smoked chicken had a desirable colour, flavour, and taste. CFTRI

14

**Studies on tenderization of tough chicken meat with papain.**

Binai Babu, N.; Kothandaraman, P.; Ramamurti, R.; Sundaradasu, V.

*Indian Journal of Poultry Science* 14 (1) 13-19 (1979) [13 ref. En] [Madras Vet. Coll., Madras-600 007, India]

In an attempt to tenderize tough chicken meat, papain was administered both ante-mortem and post-mortem to White Leghorn and Rhode Island Red chickens. Juiciness scores varied with the treatments

applied; those of White Leghorns were more consistent than those of Rhode Island Reds. The highest flavour score was obtained with a 12-h-ante-mortem papain treatment; this treatment is also more suitable for commercial application, and hence may be recommended. CFTRI

15

**Effect of estrogen on adipose tissue accumulation in chicks, with reference to changes in its chemical composition and lipase activity.**

Hasegawa, S.; Sato, K.; Hikami, Y.; Mizuno, T.

*Japanese Journal of Zootechnical Science / Nihon Chikusan Gakkai-ho* 51 (5) 360-367 (1980) [32 ref. En. ja] [Fac. of Agric., Kobe Univ., Kobe-shi 657, Japan]

Studies were conducted on effects of administration of oestrogen ( $17\beta$ -oestradiol) at daily doses of 800, 1600 or 3200  $\mu$ g/chick for 8 days on adipose tissue accumulation in male Single Comb White Leghorn chicks. Tables and graphs of data are given for abdominal adipose tissue wt. and the DNA, moisture, lipid, protein, triglyceride, phospholipid, total cholesterol and free fatty acid contents of the adipose tissue, lipoprotein lipase and hormone-sensitive lipase activity, and plasma lipid composition. The results show that oestrogen treatment increased abdominal adipose tissue wt. and increased DM, lipid, protein and moisture contents expressed as mg/mg DNA; it decreased % protein (expressed as % of DM) but had no significant effect on lipid content expressed as % DM. Oestrogen treatment gave a slight (but non-significant) increase in triglyceride concn. in the adipose tissue lipids, with corresponding decreases in phospholipid and free fatty acid concn. AJDW

16

**[Nutritional evaluation of infant foods based on poultry meat.]**

Lukacka, J.; Mravcová, I.

*Hydinarsky Priemysel* 21 (9/10) 335-341 (1979) [6 ref. Sk] [Vyskumný Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Selected products such as vegetable soups with added chicken meat and vegetable soups with chicken meat and liver were evaluated with respect to their nutritional values within the limits of recommended intakes. The vegetable soups with chicken meat and liver proved to be especially suitable for babies, due to their adequate contents of Fe, P, K, vitamin A, B<sub>2</sub>, B<sub>6</sub>, and PP, total proteins, linoleic acid, and other nutrients. The soups contained no vitamin C, which was probably destroyed during technological processes. STI

17

**Improvements in or relating to the preparation of a concentrate from waste chicken broth.**

HP Kolinska Ljubljana

*British Patent* 1 520 623 (1978) [En]

A process is described in which a dilute chicken broth is treated with an enzyme, such as papain (0.4-0.8% by wt.) for 20-60 min, combined with an antifoaming agent and concentrated to yield a composition useful as a component in the preparation of soups and gravies. IFT

## 18

[Developmental aspects of the Hungarian poultry processing industry.]

Sebestyen, G.

*Baromfitenyesztes es Feldolgozas* 27 (1) 2-11 (1980) [Hu][Baromfifeldolgozo Vallalatok Trösztje, Budapest, Hungary]

Between 1960 and 1978 Hungarian annual per capita poultry consumption increased from 9 to 17 kg. The increase in per capita egg consumption has been slower (310 eggs in 1978). Since 1960 the value of poultry and poultry products purchased by the poultry processing industry has increased by a factor of 10. To cope with the increased home market and export demands, production lines with a capacity of 8000 broiler chickens (or 4000 broiler chickens + 2000 turkeys)/h have been established. To satisfy strict hygienic requirements, 1.5 l water is used for washing and 2.5 l for cooling (immersion, head rail operated) of a carcass not heavier than 2.5 kg. Consequently, the total water requirement of a production line of 6000 broiler chickens is 24 m<sup>3</sup>/h (9 m<sup>3</sup> for washing and 15 m<sup>3</sup> for cooling). At present, the usual temp. for storing poultry and poultry products is about -25°C. ESK

## 19

[Changes in meat proteins during frozen storage of broilers at different rates of post mortem glycolysis.]  
Veränderungen der Fleischproteine während der Gefrierlagerung bei unterschiedlicher Glykogenolyse post mortem bei Broilern.

Kijowski, J.; Niewiarowicz, A.

*Fleischwirtschaft* 60 (6) 1236-1241 (1980) [43 ref. De, en][Akad. Rolnicza, Wojska Polskiego Str. 31, 60-624 Poznan, Poland]

The breast meat of broilers was examined 15 min after slaughter (pH<sub>15</sub>) for pH in 3 pH ranges (5.7/6.2/6.5), characterizing meat quality according to the rate of glycolysis, i.e. accelerated (PSE), normal and slow (DFD). The following N-fractions were determined: soluble fraction, myofibrils and sarcoplasm, denatured (coagulated) fraction, stroma and non-protein N (NPN) fraction, as well as free (accessible) SH groups, determined in fresh meat and during 6 months storage at -18°C. Results, shown graphically and in tables, revealed the lowest soluble myofibrillar and sarcoplasmic protein and highest denatured and stroma protein concn. in fresh PSE meat (compared with normal and DFD meat). Increasing pH<sub>15</sub> was accompanied by progressive rise in NPN. pH<sub>15</sub> had no noticeable effect on quantitative changes in N fractions during frozen storage. The results suggest the dominance of agglomeration processes in muscle proteins without increase in the amount of denatured (coagulated) protein fractions. NPN concn. dropped during frozen storage. The increase in insoluble aggregated proteins was mainly at the expense of enzymic sarcoplasmic proteins which are of little technological importance. The changes during 6 months' storage were related to the condition of the muscles before freezing. AS

## 20

The influence of the light transmission properties of plastic window coverings on broiler pigmentation.

Janky, D. M.; Fletcher, D. L.; Voitle, R. A.; Harms, R. H. *Poultry Science* 59 (6) 1350-1352 (1980) [10 ref. En]  
[Dep. of Poultry Sci., Inst. of Food & Agric. Sci., Univ. of Florida, Gainesville, Florida 32611, USA]

An experiment was conducted to determine the effect of different window coverings on broiler pigmentation. Equal numbers of male and female broilers were grown in open-type houses. The control house had open sides, while each treatment house had window coverings with either 42% or 89% light transmission properties. Birds from houses with window coverings deposited the same amount of pigment in the skin as did birds from the open house, as indicated by blood xanthophyll level and excitation purity. Skin color scores, however, as well as dominant wavelengths and luminosities of shanks from these birds, indicated that pigmentation of birds grown in the house with 42% light transmission window coverings was significantly inferior to that observed for birds grown in either the open house or the house with 89% light transmission window covering. It was concluded that in situations where pigmentation is of concern, care should be taken in selecting window coverings which will not adversely affect pigmentation. AS

## 21

Specific programmed multiple development-thin layer chromatography of furazolidone in chicken, turkey, swine and bovine tissues: collaborative study. Heotis, J. P.; Mertz, J. L.; Herrett, R. J.; Diaz, J. R.; Hart, D. C. van; Olivard, J.

*Journal of the Association of Official Analytical Chemists* 63 (4) 720-726 (1980) [7 ref. En][Norwich-Eaton Pharmaceuticals, Norwich, New York 13815, USA]

A specific method for assay of furazolidone at 2 ng/g was developed using programmed multiple development-TLC (PMD-TLC) and the conversion of the drug to a fluorescent species which is quantitated by fluorodensitometry on the TLC plate. The method requires only 5 g tissue, specifies an automatic spotter for PMD-TLC, and is capable of measuring <1 ng of drug when the fluorodensitometer is coupled with a computing integrator. This procedure requires an average of 2 man-h per sample and can be completed in 1 day. 6 laboratories collaboratively studied the method for assay of furazolidone at 2, 3 and 6 ng/g levels in chicken, turkey, swine, and bovine tissues. Tissues were fortified by each laboratory and then processed through extraction, solvent partition, PMD-TLC and fluorodensitometry. Results showed satisfactory recoveries and accuracy. Statistical comparison of the results demonstrated that 5 of the 6 laboratories obtained similar results. Higher responses from the 6th laboratory appeared to be due to an exceptional vacuum system and the use of silitated flasks. The mean drug recovery response for the tissues spiked at 2 ng/g from the 5 laboratories was 2.2324 ng ± 20.2% (s.d.), which at the 99.7% confidence level gives no overlap with control tissue data. The results can be expected to be applicable to other tissues.

## 22

**Contamination of broiler carcass skin during commercial processing procedures: an electron microscopic study.**

Thomas, C. J.; McMeekin, T. A.

*Applied and Environmental Microbiology* 40 (1) 133-144 (1980) [44 ref. En] [Dep. of Agric. Sci., Univ. of Tasmania, Hobart, Tasmania, 7001 Australia]

Scanning and transmission electron microscopy were used in conjunction with normal microbiological cultural techniques to examine some aspects of contamination of broiler carcass skin by bacteria during processing. The autochthonous skin microflora of poultry, before processing, was mainly *Micrococcus* spp. which were located in accumulations of sebum-like substances on the surface of the stratum corneum.

During scalding and plucking, the skin epidermis was removed, and exposed dermal tissue was contaminated by microorganisms from the mechanical plucker and subsequent stages of processing. Major sources of psychrotrophic contamination were the immersion washer and chiller water. Microbial contaminants were found within a fluid film on the skin surface and inside deep skin channels. Skin microtopography and the presence of the liquid film were implicated as major factors controlling contamination during processing.

AS

## 23

**Effect of alternately fed diets with different protein level on performance of broiler chickens.**

Rys, R.; Koreleski, J.

*Archiv für Tierernährung* 30 (1/3) 133-139 (1980) [11 ref. En] [Dep. of Anim. Nutr., Inst. of Zootech., Krakow, Poland]

500 broiler chicks (1 day old at the start of the experiment) were used in a 56-day feeding trial on effects of protein content of the diet and pattern of feeding on performance and carcass quality. 10 dietary treatments were tested, differing in protein contents during the grower and finisher periods, fasting periods of 7, 10 or 24 h at 3 or 7 days intervals, and use of alternating periods on high- and low-protein diets. Data are included for the dressing %, % breast meat, % thigh meat, and % internal fat in the carcass, for the 10 groups. The results are discussed in detail; practical implications for optimization of growth rate, feed utilization and carcass quality are discussed. AJDW

## 24

**Foodborne diseases in the United States associated with meat and poultry.**

Bryan, F. L.

*Journal of Food Protection* 43 (2) 140-150 (1980) [117 ref. En] [US Dep. of Health, Education & Welfare, Center for Disease Control, Atlanta, Georgia 30333, USA]

Surveillance data from 1968 to 1977 indicate that meat and poultry and products made from them were vehicles in over 50% of reported outbreaks of foodborne disease. The 3 most commonly identified vehicles were ham, turkey and roast beef. Ground

(cooked) beef, pork, sausage and chicken were also frequently reported as vehicles. These foods were mishandled to the extent that outbreaks resulted in foodservice establishments (65%), in homes (31%) and in processing plants (4%). The most frequently identified factors that contributed to these outbreaks were improper cooling of cooked foods (48%), foods prepared a day or more before serving (34%), inadequate cooking or thermal processing (27%), infected person touching cooked foods (23%), inadequate reheating of cooked and chilled foods (20%), improper hot storage of cooked foods (19%) and cross-contamination of cooked foods from raw foods (15%). Commonly reported foodborne diseases associated with these vehicles were staphylococcal intoxication, salmonellosis, *Clostridium perfringens* gastroenteritis, and trichinosis. AS

## 25

**Influence of low glucosinolate (cv. Tower) rapeseed meal on the eating quality of broiler chickens. I. Subjective evaluation by a trained test panel and objective measurements.**

Hawrysh, Z. J.; Steedman-Douglas, C. D.; Robblee, A. R.; Hardin, R. T.; Sam, R. M.

*Poultry Science* 59 (3) 550-557 (1980) [20 ref. En] [Foods & Nutr. Div., Fac. of Home Economics, Univ. of Alberta, Edmonton, Alberta, Canada T6C 2M8]

White Mountain x Hubbard broiler chickens were fed 1 of 4 rations: a soybean meal control ration (SBM); a 20% Tower rapeseed meal ration (RSM); a soybean meal ration with 5% herring meal, 0.1% DL-methionine, and 0.05% choline chloride (SBMHM); or a 20% Tower rapeseed meal ration with 5% herring meal, 0.1% DL methionine, and 0.05% choline chloride (RSMHM). At 8 wk of age, chickens from each ration treatment were killed, eviscerated, and frozen for later evaluation. Cooked light and dark meat and broth samples were evaluated subjectively. Objective measurements were also made. Results obtained indicated that inclusion of 20% Tower rapeseed meal in the ration did not affect the eating quality of the cooked chicken meat. However, broth prepared from chickens fed RSM was rated significantly more rancid in odour, less chickeny in flavour, and lower in overall acceptance than comparable scores for broth from chickens fed the SBM ration. Inclusion of 5% herring meal along with DL-methionine and choline chloride in rations for chickens resulted in significantly lower odour and overall acceptance scores in light meat, while dark meat received less chickeny, slightly fishy odour and flavour scores as well as lower acceptability scores than comparable samples fed the control diet. Generally, odour, flavour, and acceptability scores for broths representing RSMHM differed significantly from comparable scores for SBM broths. Light and dark meat samples from chickens fed SBMHM were generally similar to those samples from chickens fed RSMHM. However, judges rated the flavour of dark meat from chickens fed SBMHM significantly lower than that of RSMHM dark meat. Broths prepared from chickens raised on SBMHM differed significantly from SBM broths. There were no significant differences in tenderness (taste panel data and Warner Bratzler shear)

and juiciness (panel scores and water holding capacity) of light meat attributable to ration. These studies provide evidence that feeding RSM to broiler chickens does not affect the eating quality of the meat. RSMHM and SBMHM may decrease the palatability of the resulting cooked chicken. [See following abstr. for part II.] AS

## 26

### Influence of low glucosinolate (cv. Tower) rapeseed meal on the eating quality of broiler chickens. II. Subjective evaluation by a consumer panel.

Hawrysh, Z. J.; Steedman-Douglas, C. D.; Robblee, A. R.; Hardin, R. T.; Sam, R. M.

*Poultry Science* 59 (3) 558-562 (1980) [7 ref. En] [Foods & Nutr. Div., Fac. of Home Economics, Univ. of Alberta, Edmonton, Alberta, Canada T6G 2M8]

The eating quality of 8-wk old White Mountain x Hubbard broiler chickens fed 4 commercial-type rations was evaluated by 146 consumer households. The rations were: a soybean meal control ration (SBM), a 20% Tower rapeseed meal ration (RSM), a soybean meal ration with 5% herring meal, 0.1% DL-methionine, and 0.05% choline chloride (SBMHM) and a 20% Tower rapeseed meal ration with 5% herring meal, 1% DL-methionine and 0.05% choline chloride (RSMHM). Participants received 4 coded frozen half-chickens (one representing each ration treatment) and were instructed to cook each defrosted chicken half. Consumer panelists scored the odour, flavour, and overall acceptability of the chickens and then ranked the chickens in order of preference. Generally, chickens fed RSM received scores that were similar to those of comparable samples from chickens fed SBM. The odour intensity of chicken representing the RSM treatment was rated lower ( $P < 0.05$ ) than that of SBM chickens. Chickens raised on RSMHM received palatability scores which were similar to those for chickens fed RSM or the control ration. Chickens fed SBMHM received significantly lower odour intensity and flavour (intensity and like/dislike) scores than chickens fed SBM. These findings suggest that the eating quality of chickens was not affected by the inclusion of 20% Tower rapeseed meal in the rations. Inclusion of 5% herring meal along with supplemental methionine and choline in the SBM ration resulted in chickens with slightly lower eating quality scores, but the meat was judged to be acceptable in eating quality. [See preceding abstr. for part I.] AS

## 27

### Utilization of problematic animal raw material for the production of human foods: poultry and fish. (In "Anales del Tercer Seminario avanzado de Tecnología de Alimentos" [see FSTA (1981) 13 2A53]) [Lecture]

Baker, R. C.

pp. 245-251 (1979) [En] [Cornell Univ., Ithaca, New York 14850, USA]

Development of convenience foods from Leghorn fowl, broiler necks and underutilized species of fish is described. Various mechanically deboned poultry meat products market tested in the USA are listed. ESK

## 28

### Influence of rapeseed meal on the eating quality of chicken. (In 'Proceedings 5th International rapeseed conference. Vol. II.' [see FSTA (1981) 13 2N47]) [Lecture]

Steedman, C. D.; Hawrysh, Z. J.; Hardin, R. T.; Robblee, A. R.

2, 307-311 (1979) [9 ref. En] [Univ. Alberta, Edmonton, Alberta T6G 2E3, Canada]

Eating quality of light meat, dark meat and broth samples from male White Mountain x Hubbard chickens fed 4 diets in 3 replicate trials was examined. Diets were a soybean control (SBM); a soybean meal ration (SBMF); a 15% Span rapeseed ration (RSM); and a 15% Span rapeseed + 5% herring meal, 0.1% DL-methionine and 0.05% choline chloride (RSMHM) ration with a high level of methyl groups. At 8 wk broilers were killed and processed. Trained panelists did the sensory analysis using a 7 point descriptive scale to rate meat odour, flavour and acceptability, and a multiple comparison test on a 5-point scale to evaluate broth odour and flavour. A consumer study to rate eating quality by odour, flavour and acceptability involved 144 households. The RSMHM diet had adverse effects on eating quality parameters tested by both trained panelists and consumers. RSM rations may have caused a slight decrease in eating quality. LH

## 29

### [Practical cases of antibiotic resistance and related therapy.]

Lasso, A.; Neogrády, Z.

*Magyar Allatorvosok Lapja* 35 (4) 262-263 (1980)

[13 ref. Hu] [Oreglaki Allami Gazdaság, Öreglak, Hungary]

In studies on 10 000 broiler chickens (5-wk-old) showing *Escherichia coli* infection, the pathogen proved to be sensitive to neomycin, sulfotrim, and polymyxin-B, and moderately sensitive to nitrofurantoin, chloramphenicol, streptomycin and tetracycline. The treatment consisted of 0.1 g/kg body wt New-Te-Sol Pulvist for 4 days. In a further study, *E. coli* sensitive to nitrofurantoin and resistant to Sulfotrim, neomycin, tetracycline, chlorocid, and streptomycin was isolated from a flock of 25 000 broiler chickens (6-wk-old) with daily losses of 50-60 birds. Treatment consisted of the application of Tikofuran (furazolidone) for 4 days. *E. coli* sensitive to nitrofurantoin and polymyxin-B and resistant to neomycin, tetracycline, Sulfotrim, streptomycin and chlorocid was detected in 3-wk-old piglets suffering from diarrhoea. ESK

## 30

### Regression equations for estimating body composition of White Baladi chicks.

El-Husseiny, O.

*Annals of Agricultural Science, Moshtohor* 9, 221-228 (1978) [7 ref. En, ar] [Dep. of Anim. Production, Fac. of Agric., Cairo Univ., Cairo, Egypt]

Whole carcasses of 60-day old chicks were analysed for moisture, N and fat. Body water % ranged from 63 to 72%. N content ranged from 8.48 to 10.73%; fat content varied between 20, 30 and 33.54%. % body N ( $Y_n$ ) increased linearly ( $P \leq 0.01$ ) as the % body water (x) increased. An equation was calculated to govern this relationship;  $Y_n = -7.9915 + 0.2615x$  ( $r^2 = 0.9251$ ). % body fat (YF) decreased linearly ( $P \leq 0.01$ ) as the % of body water (x) increased, and the resulting linear regression equation was  $YF = 126.1421 - 1.4698x$  ( $r^2 = 0.9635$ ). It was concluded that detn. of body water for use in these equations provides a simple yet reliable means of estimating the amount of both body N and body fat in young White Baladi chicks. AJDW

### 31

#### [Pekilo biomass in diets for broilers.]

Korniewicz, A.; Mazanowska, A.; Gwara, T.

*Roczniki Naukowe Zootechniki, Monografie i*

*Rozprawy* No. 16, 77-88 (1980) [19 ref. Pl, en, ru] [Inst. Zootech., Cent. Sta. Oceny Pasz, 55-011 Siechnice, Poland]

960 Dominant White Cornish x White Rock crossbred broilers were used in an 8-wk feeding trial conducted to evaluate effects of partial or full substitution of Pekilo biomass for soybean meal in the diet on performance and carcass and meat quality. 4 diets were tested, with Pekilo replacing none,  $\frac{1}{3}$ ,  $\frac{2}{3}$  or all of the soybean meal. Tables of results are given, including data for: slaughter wt.; eviscerated carcass wt.; dressing %; offal %; breast muscle wt., gizzard wt.; abdominal fat wt.; liver wt.; the pH, water binding capacity and DM, total protein, soluble protein, fat and ash contents of the meat; and the refractive index of the fat. Fat content of the meat tended to decrease and soluble protein content tended to increase with increasing Pekilo content of the diet. AJDW

### 32

#### [Substitution of krill meal for fish meal in diets for broilers.]

Korniewicz, A.; Mazanowska, A.; Gwara, T.; Kaczmarek, K.

*Roczniki Naukowe Zootechniki, Monografie i*

*Rozprawy* No. 16, 89-101 (1980) [21 ref. Pl, en, ru] [Inst. Zootech., Cent. Sta. Oceny Pasz, 55-011 Siechnice, Poland]

960 Dominant White Cornish x White Rock crossbred broilers were used in an 8-wk feeding trial conducted to evaluate effects of partial or total substitution of krill meal for fish meal in the diet on performance, and carcass and meat quality. 4 diets were tested, in which krill meal replaced none,  $\frac{1}{3}$ ,  $\frac{2}{3}$  or all the fish meal. Tables of results are given, including data for the slaughter wt., eviscerated wt., slaughter yield, breast muscle %, offal %, heart %, gizzard %, liver %, abdominal fat %, the pH, water absorption capacity and DM, total protein, soluble protein, pigment, fat and ash contents of the meat, the vitamin A content of the liver, and the refractive index, iodine value and fatty acid composition of the fat. Internal fat % in the carcass and total protein and pigment concn. in the meat tended to increase with increasing krill meal level in the diet; no other significant effects of dietary krill meal level were observed. AJDW

### 33

#### [Krill meal in diets for laying hens.]

Korniewicz, A.; Gwara, T.; Mazanowska, A.; Kaczmarek, K.

*Roczniki Naukowe Zootechniki, Monografie i*

*Rozprawy* No. 16, 103-117 (1980) [17 ref. Pl, en, ru]

[Inst. Zootech., Cent. Sta. Oceny Pasz, 55-011 Siechnice, Poland]

208 New Hampshire laying hens were used in a study on effects of full or partial substitution of krill meal for fish meal + meat/bone meal on the laying performance, egg quality, carcass and meat quality. 4 diets were tested, in which krill meal was substituted for none,  $\frac{1}{3}$ ,  $\frac{2}{3}$  or all of the fish meal + meat/bone meal. Tables of results are given, including data for egg wt., the wt. and % of yolk, albumen and shell, composition of the yolk, albumen and shell, slaughter wt., % liver, % breast muscle, % abdominal fat, pH, water absorption capacity of the meat, vitamin A content of the liver, and refractive index of the fat. The results show no significant effect of diet on egg quality. Meat pH tended to increase and vitamin A content of the liver tended to decrease with increasing krill meal content in the diet. Meat from birds fed all 3 krill meal-containing diets had lower ash contents than that from birds fed the control diet. AJDW

### 34

#### [Lucerne juice protein concentrate in feed for broilers.]

Korniewicz, A.; Gwara, T.; Mazanowska, A.

*Roczniki Naukowe Zootechniki, Monografie i*

*Rozprawy* No. 16, 51-61 (1980) [21 ref. Pl, ru, en] [Cent. Sta. Oceny Pasz, 55-011 Siechnice, Poland]

960 Dominant White Cornish x White Rock crossbred broilers were used in an 8-wk feeding trial on effects of partial substitution of lucerne juice protein concentrate (LJPC) for soybean meal in the diet on performance, and carcass and meat quality. Diets containing 0, 4, 8 or 12% LJPC were tested. Tables of results are given, including data for: eviscerated carcass wt.; dressing %; breast muscle wt.; gizzard wt.; abdominal fat wt.; liver wt.; DM, total protein, soluble protein, crude fat and crude ash concn. in the meat; pH and water binding capacity of the meat; refractive index and I value of the fat; and vitamin A content of the liver. The results show that slaughter wt., eviscerated carcass wt., breast muscle wt., gizzard wt., and DM and total protein concn. in the meat decreased significantly with increasing LJPC concn. in the diet. AJDW

### 35

#### High-performance liquid chromatography in the analysis of chlorinated dibenzodioxins and dibenzofurans in chicken liver and wood shaving samples.

Ryan, J. J.; Pilon, J. C.

*Journal of Chromatography* 197 (2) 171-180 (1980)

[12 ref. En] [Food Directorate, Tunney's Pasture, Ottawa, Ontario K1A OL2, Canada]

High-performance liquid chromatography (HPLC) has been used to cleanup chicken liver and wood shaving samples for their subsequent analysis by MS.

With a reversed-phase system and discrete fraction collection, hexa-, hepta-, octachlorodibenzodioxin and octachlorodibenzofuran have been detected in wood shavings and chicken livers to a lower level of 25 pg/g. With the use of HPLC as a cleanup tool, the MS determination both on the probe and by gas chromatography MS resulted in an improved peak shape and a stronger more accurate signal for the dioxins and furans. AS

## 36

**Stacker crane system pivot of Weaver's efficient high-rise zero warehouse.**

Anon.

**Quick Frozen Foods** 41 (7) 66-67, 69-70, 72 (1979) [En]

A description is given of the fried chicken storage freezer warehouse of Victor F. Weaver, Inc. of New Holland, Pennsylvania, USA. The 3 million-pound-capacity storage freezer is serviced by a Litton Man Rider storage and retrieval system. A stacker crane services the freezer warehouse portion of this new 85 000 ft<sup>2</sup> manufacturing plant. The warehouse is reportedly one of the highest ever, erected with metal-clad, urethane, insulated panels. The product leaves the electric fryers, moves to a blast freezer, then to packaging machines, then into storage in the refrigerated warehouse. The company produces 3 kinds of precooked, frozen fried, chicken: Dutch Frye, Batter Dipped and Touch-O-Honey. The company also markets chicken hot dogs, chicken roll, croquettes, turnovers, chicken fillets, chicken au gratin, chicken bologna and turkey ham. VJG

## 37

**The effect of diet, feed withdrawal and carcass chilling on the live and eviscerated weights of broiler chickens.**

Proudfoot, F. G.; Hulan, H. W.

**Canadian Journal of Animal Science** 60 (2) 461-464 (1980) [4 ref. En, fr] [Res. Sta., Agric. Canada, Kentville, Nova Scotia B4N 1J5, Canada]

Feed was withdrawn 0, 8 and 18 h prior to slaughtering 900 forty nine day old broiler chickens reared on 6 different diets, and the effect on carcass wt. studied. Eviscerated wt. gains increased on cooling and holding in ice for 20 h, by 6.9 and 6.5% in male and female birds, resp. This was not affected by diet or feed withdrawal. Body wt. of broilers was not affected by diet but feed withdrawal 8 and 18 h pre-slaughter caused wt. loss equivalent in economic terms to 2.0 and 8.4 cents/bird, resp. Feed withdrawal 8 h prior to slaughter for crated birds might reduce carcass contamination and so is recommended. LH

## 38

**Distillery effluents as animal feed: the use of condensed beet molasses stillage (CBMS) in broiler feeding.**

Manfredini, M.; Cavani, C.

**Animal Feed Science and Technology** 5 (3) 233-239 (1980) [3 ref. En] [Istituto di Zootecnia & Nutr. Anim., Univ. degli Studi di Bologna, Via S. Giacomo, 11, Bologna, Italy]

176 male Hubbard broilers were used in a feeding trial over the period 21-56 days of age, conducted to evaluate effects of diets with 0, 2.5, 5.0 or 7.5% condensed beet molasses stillage (CBMS) on performance and carcass quality. Tables of results are given, including data for slaughter wt., carcass wt., carcass composition (moisture, protein, ether extract, ash) and the fatty acid composition of the abdominal fat pad. The results show that ash content of the carcass increased and ether extract content decreased significantly with increasing dietary CBMS concn. In the abdominal fat pad, concn. of myristic and linoleic acids increased and concn. of oleic acid decreased with increasing dietary CBMS level. High levels of CBMS decreased skin pigmentation intensity. AJDW

## 39

**Sources of salmonellae in an uninfected commercially-processed broiler flock.**

Rigby, C. E.; Pettit, J. R.; Baker, M. F.; Bentley, A. H.; Salomons, M. O.; Lior, H.

**Canadian Journal of Comparative Medicine** 44 (3) 267-274 (1980) [11 ref. En, fr] [Agric. Canada, Anim. Diseases Res. Inst., PO Box 11300, Nepean, Ontario, Canada K2H 8P9]

Attempts were made to establish the sources and incidence of salmonellae in a flock of 4160 broilers (originating from 8 commercial breeding flocks) raised on litter to 7 wk of age, then transported to a commercial plant and processed. Intensive monitoring was conducted to determine the presence and sources of salmonellae in the chickens and their environment during growth, transport and processing. Samples monitored were: nest litter from the 8 parent flocks, eggs and fluff from the hatcher, floor litter from the growing pens, feed and feed ingredients, dead and culled chickens, chickens killed before and after transport, plastics crates used for transport, processing equipment (e.g. chill tank, defeatherer), and processed carcasses. The isolation methods and cultural procedures used are detailed. Although the nest litter of 4 of the 8 parent flocks yielded salmonellae, the entire flock of 4160 birds and their environment remained free of salmonellae throughout the growing period. On arrival at the processing plant 2 of 23 birds sampled carried *Salmonella infantis* on their feathers and 3 of 18 processed carcasses yielded salmonellae (*Salm. infantis*, *Salm. heidelberg*, *Salm. typhimurium* var. *copenhagen*). The studies suggested that the most likely source of this contamination was the transport crates since 15 of 107 examined before being loaded yielded salmonellae (*Salm. infantis*, *Salm. typhimurium*); a crate washer did not reduce the incidence of salmonellae-contaminated crates. With regard to the processing equipment, no salmonellae were isolated from the chill tank either before or after processing, while the defeatherer yielded several *Salmonella* spp. before, during and after processing. JA

40

**Flock infection and transport as sources of salmonellae in broiler chickens and carcasses.**

Rigby, C. E.; Pettit, J. R.; Baker, M. F.; Bentley, A. H.; Salomons, M. O.; Lior, H.

*Canadian Journal of Comparative Medicine* 44 (3)

328-337 (1980) [6 ref. En, fr] [Agric. Canada, Anim.

Diseases Res. Inst., PO Box 11300, Nepean, Ontario, Canada K2H 8P9.]

Attempts were made to determine the incidence and sources of salmonellae in a flock of 4160 broilers (originating from 8 parent flocks) raised on litter in 32 pens. The samples examined and the sampling and cultural methods were the same as those described in a previous paper [see preceding abstr.]. Results for nest litter, eggs and hatcher fluff indicated that salmonellae were not transmitted from the parent flocks to their progeny. Of the 32 pens, 25 remained salmonellae-free during the 7 wk growing period, while *Salm. johannesburg* was detected in 7 and also in the

intestines of dead or culled chicks obtained from 2 of the infected pens. This sp. was first detected in the meat meal component of the starter ration but not in the complete ration. 2 of the infected pens and some dead chicks also yielded *Salm. alachua*. Studies of the plastics transport crates indicated that 97 of 112 examined before loading were contaminated with salmonellae (15 different serovars), while 97 of 132 examined after passing through a crate-washing machine also yielded salmonellae (11 serovars including *Salm. johannesburg* and *Salm. alachua*). *Salm. johannesburg* and/or *Salm. alachua*, together with other serovars, were isolated from the intestines and/or feathers of a high proportion of the birds arriving at the processing plant. 11 of 25 processed carcasses yielded salmonellae (*Salm. typhimurium*, *Salm. alachua*, *Salm. haardt*, *Salm. johannesburg*). With regard to processing equipment, neither the chill tank nor the defeatherer yielded salmonellae before processing but both gave positive results after processing. It is concluded that flock infection, cross-contamination during transport and inadequately cleaned crates are the major sources of salmonellae contamination of processed carcasses. JA

41

**[Effects of dried skim milk as a protein source in the diet on meat quality in broilers. II.] Einflüsse von**

**Magermilchpulver als Eiweisskomponente im Futter auf die Fleischbeschaffenheit von Broilern. II.**

Ristic, M.; Vogt, H.

*Archiv für Geflügelkunde* 44 (3) 129-132 (1980) [2 ref. De, en, fr, ru] [Inst. für Fleischerzeugung, Bundesanstalt für Fleischforschung, D-8650 Kulmbach, Federal Republic of Germany]

Groups of broilers were fed isoenergetic isonitrogenous diets containing 0, 3, 6, 9, 12, 15, 18 or 21% dried skim milk, in a 7-wk feeding trial. They were then slaughtered, scalded, plucked, packaged in polyethylene bags, frozen, stored at -20°C for 10 wk, thawed, and evaluated. Tables of data are given for slaughter wt., drip loss, grilling loss, rigor value and the pH, colour, sensory properties and objectively-

measured tenderness of breast and thigh meat. The results show that drip loss decreased, and thigh pH and thigh and breast meat colour to increase with increasing level of dried skim milk in the diet. [See FSTA (1979) 11 1S186 for part I.] AJDW

42

**The utilization of animal tallow as influenced by the addition of various levels of unsaturated fat.**

Summers, J. D.; Leeson, S.

*Nutrition Reports International* 21 (5) 755-759 (1980) [9 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

As part of a study on synergism between tallow and corn oil, male broilers were fed a basal diet containing 10% tallow and 0, 0.1, 0.5, 1.0, 1.5, 2.0 or 2.5% corn oil. Effects on % fat and % protein in whole carcass and viscera were studied; however, results showed no significant difference between control and experimental broilers. SP

43

**Effect of nutrition level on the composition of sarcoplasmic proteins in skeletal muscles of chicken.**

Rosochacki, S. J.

*Prace i Materiały Zootechniczne* No. 19, 71-85 (1979)

[28 ref. En, pl, ru] [Inst. of Genetics & Anim. Breeding, Polish Acad. of Sci., Jastrzebiec, 05-551 Mrobow, Poland]

48 female White Plymouth Rock hens were used in an 80-day feeding trial in which effects of high or low planes of nutrition (feed allowance increasing by 3.0 or 1.5 g/day resp.) on sarcoplasmic protein (SP) fractions in the skeletal muscle (breast and leg) were studied. Data are presented for % SP in the muscles, the correlation between SP content and age of the chickens, SP content as a function of muscle wt., correlations between contents of individual SP fractions and muscle wt., and contents of individual SP fractions in the 2 muscles. At equal age, pectoral muscles had higher concn. of total SP and SP fractions than thigh muscles. Muscle samples from birds receiving the higher plane of nutrition had higher concn. of various SP fractions than samples from those receiving the lower plane of nutrition. At equal muscle wt., the pectoral muscles had higher concn. of total SP and SP fractions than the thigh. Effects of plane of nutrition on SP fractions differed between the two muscles studied. AJDW

44

**Mechanical deboning of poultry.**

Helmer, W. D.; Small, R. E. (Campbell Soup Co.)

*United States Patent* 4 213 229 (1980) [En]

Method and apparatus for separating poultry meat from bone by centrifugal force are described. A poultry section is attached to a rotating member; the high-speed rotation of the member with controlled acceleration causes separation of meat from the bone. This dry method produces large chunks of meat, neatly and conveniently separated from the bone. An apparatus which separates meat from bone of a plurality of carcasses in semi-automatic fashion is also described. Poultry pieces, continuously attached to the apparatus by hand, are automatically deboned by centrifugal force

## 45

**Changes in the *Salmonella* status of broiler chickens subjected to simulated shipping conditions.**

Rigby, C. E.; Pettit, J. R.

*Canadian Journal of Comparative Medicine* 44 (4)

374-381 (1980) [12 ref. En] [Agric. Canada, Anim. Diseases Res. Inst., PO Box 11300, Station H, Nepean, Ontario K2H 8P9, Canada]

Studies were conducted on market-age broiler chickens from flocks infected with *Salmonella typhimurium*, placed in either clean crates or crates contaminated with *Salm. alachua*, and slaughtered after simulated transport for 5, 19 or 24 h. Samples of cloacal faeces, caecae and surface swabs from the birds were tested for salmonellae, together with corresponding samples from pen-mate birds not subjected to simulated transport. Tables and block diagrams of results are given. The results show that holding in crates significantly increased the proportion of *Salm. typhimurium* carriers (irrespective of the time spent in the crates), the increase in number of carriers being mainly due to an increase in the proportion of birds with *Salmonella*-positive caecal samples. Holding of 24 broilers in cages contaminated with *Salm. alachua* showed 100% to be infected; 22 had caecae and 75% had faeces positive for this organism. 15 of 24 broilers shipped at the same time in the same truck in clean cages also became infected with *Salm. alachua*. Hygienic implications for the handling and transport of slaughter broilers are briefly considered. AJDW

## 46

**[Problems with calculation of the migration of moisture out of packaged frozen foods.]**

Vahl, L.

*Voedingsmiddelentechnologie* 13 (11) 20-25 (1980) [NL, en] [Tech. Hogeschool, Delft, Netherlands]

Migration of moisture out of frozen foods during storage is discussed, with reference to migration of moisture through the packaging material, and frost formation within the pack. It is concluded that, with correct choice of packaging material, efficient sealing and lack of damage to the pack, moisture loss through the packaging material is unlikely to present a significant problem. Moisture loss from the product by frost formation within the pack during freezing and/or storage is also considered, with special reference to the potential for calculation of the extent of frost formation and wt. loss. It is suggested that wt. loss due to frost formation during freezing of broilers could be minimized by rapid low-temp. freezing before packaging. Prediction of wt. loss due to frost formation as a result of temp. fluctuation during storage is possible; it is, however, necessary to determine a product/pack system-specific constant for use in the prediction equation. AJDW

## 47

**The influence of environmental and processing conditions on the physical carcass quality factors associated with oily bird syndrome.**

Fletcher, D. L.; Thomason, D. M.

*Poultry Science* 59 (4) 731-736 (1980) [10 ref. En]

[Univ. of Georgia, Athens, Georgia 30602, USA]

2 experiments were conducted to determine the influence of dietary energy, environmental temp., scald water temp., and batch picking time on the carcass quality factors often associated with oily bird syndrome. In experiment 1 birds were fed dietary energy levels of 3100, 3400, and 3700 kcal/kg and processed at either 53.3°C scald and 60 s picking time or a 60°C scald and 25 s picking time. In experiment 2, 2 dietary energy levels (3230 and 3440 kcal/kg) were fed to birds reared in either 23.9° or 35.0°C environmental temp. pens. 3 scalding temp. treatments (50.0°, 53.3° and 56.7°C) and 2 picking time treatments (30 or 60 s) were evaluated on birds from each environmental and dietary treatment. Individual live wt., dry eviscerated wt., ready-to-cook wt., and moisture absorption after chilling were determined. Subjective scores for oily, loose, and broken skin were performed on each bird. Results indicated that dietary energy and environmental temp. had little effect, other than those influenced by bird wt., on the carcass quality parameters tested. Scald water temp. had little effect on moisture absorption, but did influence the subjective skin scores. The greater picking stress resulted in increased moisture absorption, oily, loose, and broken skin scores. AS

## 48

**Correlation of minimum sensory doneness with internal temperature of deep fat fried chicken thighs.**

Lane, R. H.; Muir, W. M.; Mullins, S. G.

*Poultry Science* 59 (4) 719-723 (1980) [24 ref. En] [Dep. of Nutr. & Food Sci., Univ. of Kentucky, Lexington, Kentucky 40506, USA]

Breaded raw chicken thighs were deep-fat fried at 163°C (325°F) to specific internal end-point temp. in the range 89-99°C. A modified triangle test was used by a trained panel to distinguish differences in doneness and preference in internal end-point temp. Results indicated that min. sensory doneness corresponded to an internal thigh temp. of 93°C (200°F) and fry time of 14.5 min. AS

## 49

**[Comparison of viscoelastic properties of breast and thigh meat and effect of dietary fat levels on their properties in chickens of different ages.]**

Watanabe, Y.; Gotoh, N.

*Japanese Journal of Zootechnical Science [Nihon Chikusan Gakkai-ho]* 51 (8) 568-573 (1980) [18 ref. Ja, en] [Aizu Junior Coll. of Fukushima Prefecture, Aizuwakamatsu-shi 965, Japan]

52 female Cornish x White Rock chickens were used in a study on effects of diets (with 0, 5 or 10% soybean oil) and age at slaughter (10, 20 or 34 wk) on the viscoelastic properties of breast (*pectoralis profundus*) and thigh (*iliotibialis*) muscle. Stress relaxation measurements were carried out on 50 mm long muscle samples (cut with the long axis parallel to the plane of the muscle fibres), using a Tabin Chainomatic Balance Food Rheometer. The samples were stretched 13.5 mm at a speed of 2.8 mm/s, then held for 5 min in a chamber at  $30 \pm 1^\circ\text{C}$  and  $50 \pm 5\%$  RH. Tables of data are given for the viscoelastic properties of the muscle samples.

The results show that max. force and relaxation time were higher for thigh than for breast meat. The S/f<sub>o</sub> value was higher for thigh than for breast meat, suggesting that thigh meat is firmer than breast meat. Dietary soybean oil content had little effect on the variables studied. [From En summ.] AJDW

## 50

### Qualities of pickled chicken gizzards as affected by salt and vinegar.

Charoenpong, C.; Chen, T. C.

*Poultry Science* 59 (3) 537-542 (1980) [11 ref. En]  
[MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Fresh chicken gizzards were pickled with 2 sets of solutions; one set had a constant level of 50% cider vinegar and 0, 7.7, 15.3 and 23.0% NaCl; the other set had a constant level of 11.5% NaCl and 0, 25, 50 and 75% cider vinegar. All the pickled products were heat processed and stored at 24-25°C. Qualities of these products were measured after 1 wk or 3 months of storage. No microorganisms were detected in any of the pickled products after storage. In a comparison of the different NaCl levels, pickled gizzards containing 23.0% NaCl had the highest shear values. There were no significant differences ( $P < 0.05$ ) in shear values between 7.7% and 15.3% NaCl pickled gizzards, nor between 25% and 50% vinegar pickled gizzards. In the presence of different levels of NaCl, a decrease in product tenderness directly correlated ( $r = 0.8180$ ) with a decrease in their drained wt. NaCl, vinegar, and storage time did not influence the thiobarbituric acid value of the juices or the meats of the pickled products.

AS

## 51

### Potassium sorbate dip as a method of extending shelf life and inhibiting the growth of *Salmonella* and *Staphylococcus aureus* on fresh, whole broilers.

To, E. C.; Robach, M. C.

*Poultry Science* 59 (4) 726-730 (1980) [17 ref. En]  
[Monsanto Co., 800 N. Lindbergh Boulevard, St. Louis, Missouri 63166, USA]

In 2 separate plant studies, the refrigerated shelf life of fresh whole broilers at 3°C was extended by dipping freshly chilled carcasses in a 5% (w/w) solution of potassium sorbate for 1 min. After 7 days, control birds had odour and slime formation, and psychrotrophic counts  $> 10^7/cm^2$ . Sorbate-treated birds showed no spoilage until the 14th or 15th day. Dipping in sorbate also reduced the growth of *Salmonella* sp. and *Staphylococcus aureus* inoculated onto the broiler carcasses. This study confirmed earlier findings that sorbate is effective in controlling growth of spoilage organisms associated with fresh poultry. AS

## 52

### Carcass quality changes with the broiler chicken after dietary protein restriction during the growing phase and finishing period compensatory growth.

Moran, E. T., Jr.

*Poultry Science* 58 (5) 1257-1270 (1979) [24 ref. En]  
[Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph,

Commercial source chicken broilers were placed sex-separate in floor pens; all received a 24% protein, 3100 kcal metabolizable energy/kg ration during the first 2 wk. Through the 2-5 wk growing period, males received a 24, 22, or 20% protein, 3100 kcal feed; females were fed a 24, 20, or 16% protein ration of the same calorie content (4 pens of 100 for each protein level and sex). Finishing involved 5-7 wk for the males, all birds receiving the same 20% protein, 3200 kcal feed. Females were given a 16% protein, 3200 kcal ration from 5-8 wk. Combinations of corn, soybean meal, and tallow were used in all instances. Males receiving the 22% protein feed during the growing period did not exhibit a body wt. difference from those continued on the starting ration, but their feed conversion was poorer. Both gain and feed efficiency were reduced with cockerels offered the 20% protein ration. Compensatory growth during the subsequent 2 wk finishing period was such that all males ended with comparable body wt. and total feed conversion. Carcass grading at 5 wk indicated substantial fat cover increases and fleshing decreases as grower protein was reduced. By 7 wk, effects on fleshing were minimal but earlier finish changes continued to be readily apparent. Females presented a parallel pattern of results. However, reductions in fleshing were less and finish increases larger than with males. % apparent carcass yield was not affected. The results show that consumer-related alterations in carcass quality that are defined by the Canadian Grading System can readily occur as a consequence of earlier treatment and without changes in live performance parameters. AS

## 53

### Toxicity and bioaccumulation of pentachlorophenol in broiler chickens.

Stedman, T. M., Jr.; Booth, N. H.; Bush, P. B.;

Page, R. K.; Goetsch, D. D.

*Poultry Science* 59 (5) 1018-1026 (1980) [42 ref. En]  
[Coll. of Vet. Med. & Extension, Poultry Sci. Dep., Univ. of Georgia, Athens, Georgia 30602, USA]

Hubbard-Hubbard broiler chickens were fed graded levels (0, 1, 10, 100, and 1000 p.p.m.) of pentachlorophenol (PCP) containing <0.0023% octachlorodibenzo-p-dioxin (OCDD) for 8 wk. Tissue samples for PCP, OCDD, and pentachloroanisole (PCA) were cleaned up by gel permeation chromatography and analysed by gas chromatography employing electron capture detection. Kidney wt. were significantly increased by the 100 p.p.m. and 1000 p.p.m. PCP diet. Wt. of all other organs, including the body wt., were significantly lowered by the 1000 p.p.m. PCP diet. Except for the control group, histopathological examination of the liver revealed bile duct proliferation and some fatty changes in all of the 6-wk-old birds. Examination of the brain, liver, gizzard, pancreas, intestine, proventriculus, spleen, kidney, lung, and heart revealed no histopathological lesions in the treated or control birds. Significant linear relationships were found between PCP accumulation in tissues and the concn. of dietary PCP. Accumulation of PCP was greatest in the kidney, followed by liver, heart, leg, breast, gizzard, and fat. The high residue levels in the kidney and liver may reflect principal routes of elimination and metabolism. Following a 5 wk withdrawal of PCP from the diet, PCP residues were still present in the adipose tissue of all treated birds.

Residue levels in the kidney and liver were reduced at the 1st and 3rd wk of withdrawal, but a continuous decline was interrupted by a slight elevation in residue level at the 5th wk of withdrawal. AS

## 54

**A mathematical model of continuous-immersion chilling of broiler carcasses.** (In 'Food process engineering 1979'[see FSTA (1981) 13 4E167])  
[Lecture]

Neves, L C. F.; Fioreze, R.

Abstr. no. 2.1.8 (1979) [En] [Campinas State Univ., Fac. of Food & Agric. Eng., Campinas, Brazil]

A mathematical model was prepared, and tested by computer simulation, of chilled water cooling of poultry in 2 tanks in series with a screw conveyor. Calculated results agreed well with data from a slaughterhouse handling 4000 birds/h. Typical values for incoming breast muscle at 40°C were: at 3 water/product flow rates of 1.6, 2.1 and 3.4 l/kg, final product temp. were 11°, 9° and 7.4°C; thermal conductivity was 0.42 kcal/h m °C, specific heat 0.8 kcal/kg °C, density 1070 kg/m³; heat transfer from carcass to water 800 kcal/h m² °C and from equipment to surrounding air 10 kcal/h m² °C; water temp. inlet 0.5°C and outlet for 3 flow rates 21°, 16.4° and 11°C; air temp. 20°C; equipment size 15 × 1.7 m; and chilling time 33 min. ELC

## 55

[Prolonged storage of poultry.] Langlagerung von Geflügel.

Ristic, M.

*Fleischerei* 31 (9) 944-948 (1980) [5 ref. De]  
[Bundesanstalt für Fleischforschung, D-8650 Kulmbach, Federal Republic of Germany]

Studies were conducted on changes in the quality of broilers during storage at -10°C for up to 9 months, at -15°C for up to 17 months, or at -20° or -30°C for up to 21 months. Quality characteristics evaluated included drip loss, freezer burn, juice loss of the packaged product, appearance, muscle pH, cooking loss, organoleptic properties, and physico-chemical criteria of fat stability. Graphs of results are given, and discussed in detail. Values suggested for max. storage life for top quality (no deterioration), good quality (slight deterioration) and standard quality (some deterioration, but acceptable quality) resp. are: at -10°C, 4, 5 and 6 months; at -15°C, 7, 11 and 13 months; at -20°C, 12, 15 and 18 months; and at -30°C, 15, 17 and 19 months. AJDW

## 56

**Fat deposition in broiler chickens.**

Hood, R. L.

*Proceedings of the Nutrition Society of Australia* 4, 132 (1979) [1 ref. En] [CSIRO Div. of Food Res., North Ryde, NSW 2113, Australia]

Preliminary results of a study of the cellular basis of fat deposition in broiler chickens are presented. Chickens were fed prestarter diets for 37 days and a finishing diet for the rest of a 17 wk period. 10 g ground samples of chicken flesh were examined for adipose cell

number by fixing these cells with OsO<sub>4</sub>, isolating them and counting them on a Coulter electronic particle sizer. % body fat increased 10-29.5% from 3 to 14 wk of age and abdominal fat pad wt. rose. At constant % body fat, male birds had larger abdominal fat depots, which up to 17 wk old were due to hyperplasia and hypertrophy of adipose cells. A correlation was found between abdominal fat pad wt. and average vol. of adipose cells present. LH

## 57

[Meat quality of broiler chickens given rations containing dried pig faeces.]

Gilka, J.; Habrda, J.; Krejci, P.; Matyas, Z.

*Veterinarni Medicina* 25 (4) 241-256 (1980) [33 ref. Cs, ru, en, de] [Vyzkumny Ustav Vet. Lekarstvi, 621 32 Brno, Czechoslovakia]

Groups of 20 (10 male and 10 female) 3-wk-old Ross chicks were kept in cages for 55 days on a common basal ration (i) without supplement (control), (ii) with 2%, (iii) with 5%, and (iv) with 10% dried pig faeces added as a faeces/lucerne meal premix. (i)-(iv) rations were made equal in N and energy contents by suitable additions. 12 broilers from each group were then slaughtered, and slaughter values were examined exactly as described in the preceding abstr., but breast and leg meat were analysed separately. Though some significant differences were found in organoleptic assessment (better aroma of cooked control than (iii) meat) and in some chemical characteristics, they were not in general related to quantity of faeces added to ration and are not considered to have affected meat acceptability. SKK

## 58

[Occurrence of foreign substances in food products from animals given feed supplements of animal excreta.]

Gilka, J.; Bartos, J.; Gajduskova, V.; Malikova, M.; Masek, J.; Matyas, Z.

*Veterinarni Medicina* 25 (3) 179-192 (1980) [40 ref. Cs, ru, en, de] [Vyzkumny Ustav Vet. Lekarstvi, 621 32 Brno, Czechoslovakia]

10 bullocks each received a daily supplement of 0.8 kg dried pig excreta (DE) in the basal ration for various lengths of time, and 10 controls received the basal ration alone; 4 bullocks received similarly 26.4% of the ration as DE, 4 received similarly 26.90% dried poultry droppings; 6 pigs received similarly 5% of ration DM as DE; laying hens were given for several months 0 or 5-10% of the ration as DE; and groups of broilers received 0, 2.5, 5 or 10% of DE in the ration. Muscles, liver and kidney fat were examined in bullocks and pigs, and muscles and liver were examined in hens and broilers, as well as eggs laid by the hens, contents of aflatoxin, antibiotics, chlorinated pesticides, and Cd, Pb, Mn, Cu, Zn and Fe being determined. The results are tabulated in detail. No aflatoxin or antibiotics were detected in any of the samples, and no differences in contents of pesticides or heavy metals were found between products from animals given the excreta and those from control animals. SKK

59

**Transmissible drug resistance in *Escherichia coli* isolated from poultry and their carcasses in Iran.**

Nazer, A. H. K.

*Cornell Veterinarian* 70 (4) 365-371 (1980) [12 ref. En] [Dep. of Vet. Public Health & Food Hygiene, School of Vet. Med., Shiraz Univ., Shiraz, Iran]

Studies were conducted on antibiotic resistance of *E. coli* strains isolated from ante-mortem rectal swabs from 560 broilers, and from a random sample of 560 broiler carcasses from a processing line. Carcasses were sampled by shaking with 1 l sterile distilled water in a plastics bag for 1 min. Resistance to tetracycline, chloramphenicol, sulphafurazole, streptomycin, ampicillin, neomycin and furazolidone was evaluated. Tables of results are given. Of 560 isolates from rectal swabs, 456 (81.4%) were resistant to 1 or more drugs; 31 different resistance patterns were observed. 192 *E. coli* strains isolated from carcasses were antibiotic-resistant. The multiple patterns most commonly found in this study were tetracycline/chloramphenicol/streptomycin, tetracycline/chloramphenicol/sulphafurazole, and tetracycline/streptomycin/sulphafurazole. 100 of the 658 resistant *E. coli* isolates were capable of transferring resistance to a laboratory strain of *E. coli* K-12. Resistance patterns of the *E. coli* isolates appeared to be related to the antibiotics administered in the feed. AJDW

60

**The effect of cultural procedures on the attachment of bacteria to chicken breast meat.**

Notermans, S.; Dufrenne, J.; Schothorst, M. van

*Journal of Applied Bacteriology* 49 (2) 273-279 (1980) [6 ref. En] [Lab. for Zoonoses & Food Microbiol., Nat. Inst. of Public Health, Bilthoven, Netherlands]

Various bacterial strains were cultured in a laboratory medium, on chicken breast meat or derived from faeces of orally infected chicks. Suspensions of these bacterial cultures were brought in contact with chicken breast meat. The way in which the bacteria were cultured had little influence on the number of bacteria which attached to the chicken breast meat surface or on the strength of attachment (i.e. the easiness of removal of attached bacteria). Only bacteria from the faeces of freshly infected chicks (24 h after inoculation) attached in higher numbers (more than one log<sub>10</sub> unit) and these were less easy to remove. AS

61

**Removing faecal contamination of broilers by spray-cleaning during evisceration.**

Notermans, S.; Terbijhe, R. J.; Schothorst, M. van

*British Poultry Science* 21 (2) 115-121 (1980) [13 ref. En] [Lab. for Zoonoses & Food Microbiol., Nat. Inst. of Public Health, PO Box 1, Bilthoven, Netherlands]

Faecal contamination of broiler carcasses during evisceration results in an increase in contamination with Enterobacteriaceae, including any salmonellae present.

This increase can be prevented completely by spray-cleaning carcasses during the various stages of evisceration. If the carcasses are cleaned only at the end of the evisceration process, the numbers of Enterobacteriaceae are not reduced to initial levels and *Salmonella* contamination is less efficiently removed. AS

62

**[Food poisoning by *Bacillus cereus*.] [Review]**

D'Aubert, S.; Abbati, P.; Cantoni, C.

*Industrie Alimentari* 19 (12) 913-921, 926 (1980)

[102 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Anim. Univ. degli Studi, Milan, Italy]

Aspects covered in this review include: characteristics of *B. cereus*, antigen factors, toxin synthesis and release, identification, and pathogenicity. Additionally, a case of food-borne *B. cereus* poisoning (from a chicken dish), including all the analytical stages, is described. HBr

63

Comparison of the effects of liquid medium repair and the incorporation of catalase in MacConkey type media on the recovery of Enterobacteriaceae sublethally stressed by freezing.

Mossel, D. A. A.; Veldman, A.; Eelderink, I.

*Journal of Applied Bacteriology* 49 (3) 405-419 (1980) [65 ref. En] [Dep. of the Sci. of Food of Anim. Origin, Univ. of Utrecht, Utrecht, Netherlands]

9 pure cultures of spp. of Enterobacteriaceae [spp. of *Escherichia*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella* and *Yersinia*] were stressed by rapid freezing in tryptone soy broth (TSB) to -22°C and subsequent storage at that temp. for 7 days. 1-2 log cycles kill and > 1 additional log cycle sublethal impairment was achieved. Numbers of colonies of these cultures in poured plates of violet red bile glucose (VRBG) agar, with 67 units/ml of catalase added at 47°C, were only slightly higher than those in plain VRBG, both incubated overnight at 30°C. Incubation of TSB suspensions at 17-25°C for 2 h resulted in almost complete restoration of the ability of cells to develop colonies in VRBG, without, however, leading to any significant multiplication. Similar experiments with 32 samples of frozen minced meat, 27 samples of frozen surface water, 18 of frozen chicken liver and 14 of fresh sausage substantiated the results obtained in the studies on pure cultures. In experiments with the 9 pure cultures, influence of nutrient composition of the solid enumeration media: 'minimal' agar, TSB agar (TSBA) and Mueller-Hinton agar with Polyvitex nutrient supplement (MHA), on recovery of Enterobacteriaceae stressed by freezing was also studied. Colony numbers in TSBA and MHA were virtually identical. The glucose mineral salts medium led to lower recovery, indicating that so-called 'minimal medium recovery' of stressed bacterial populations is not a common phenomenon. AS

## 64

[Use of liquid nitrogen for cooling and freezing poultry meat.]

Eljasik, J.; Kondratowicz, J.; Dobrzycki, J.  
*Zeszyty Naukowe Akademii Rolniczo Technicznej w Olsztynie, Technologia Zywosci* No. 15, 303-316  
 (1979) [27 ref. Pl, ru, en] [Inst. Hodowli & Tech. Produkci Zwierzej, AR-T, Olsztyn, Poland]

(i) 120 chicken carcasses were cooled in ice water for about 30 min to an internal breast-muscle temp. of 4°C; (ii) 120 carcasses were cooled to the same temp. in 8-10 min in a British Oxygen Company liquid N<sub>2</sub> tunnel installation of 100 kg/h capacity; and (iii) 120 carcasses were not cooled (temp. 29°C). All carcasses were then individually wrapped in foil. Half of (i)-(iii) batches were frozen in the liquid N<sub>2</sub> installation in 19-23 min to -20°C, and the other half was frozen in an air blast tunnel at -35°C in about 5 h to -20°C; the frozen carcasses were carton-packaged and stored at -20°C for 6 months. The carcasses were examined after storage for 1 wk and 6 months, the following being determined: wt. losses during cooling and freezing, and during storage and subsequent defrosting; pH, water absorption capacity, colour, non-protein N content of drip, contents of DM, crude protein, fat and ash; and after cooking in 0.8% NaCl solution to internal muscle temp. of 79°C, wt. loss, tenderness (Instron apparatus), aroma, taste and texture. The results are tabulated in detail. The main conclusions were: ice-water cooling caused wt. increases, but the meat characteristics were inferior to those after N<sub>2</sub> cooling; there were no essential differences between the effects of the 2 methods of freezing on meat quality, but N<sub>2</sub> freezing caused 4 x smaller carcass wt. losses; in overall assessment, cooling and freezing in N<sub>2</sub> proved the best procedure; in general, frozen storage, irrespective of method of cooling and freezing, lowered meat quality.

SKK

## 65

[Breed and sex differences in the growth of the hind leg muscle in the chicken.]

Iwamoto, H.; Ono, Y.; Takahara, H.; Okamoto, M.  
*Science Bulletin of the Faculty of Agriculture, Kyushu University* 34 (1/2) 19-27 (1980) [8 ref. Ja, en]  
 [Lab. of Anim. Husbandry II, Kyushu Univ. 46-06, Fukuoka 812, Japan]

Studies were conducted on leg muscle wt. in male and female (i) Rhode Island Red, (ii) Barred Plymouth Rock and (iii) White Leghorn and in male (iv) White Cornish chickens slaughtered at 2-19 wk of age. Data are presented for hind leg muscle wt. as % of live wt., hind leg muscle wt. as % of total muscle wt., and femoral, pelvic and crural parts of the leg muscle as % of total muscle wt., together with regressions comparing growth of the hind leg muscle and its pelvic, femoral and crural components among breeds and sexes. (i) had the highest proportion of hind leg muscle (as % of live wt. or % of total muscle wt.) among the breeds studied; (iv) had the lowest proportion of hind leg muscle, but had the highest rate of increase of live weight. (iii) had the

poorest overall hind leg meat production, due to a low proportion of hind leg muscle combined with low growth rate. Proportion of crural and pelvic muscle was highest in (i); proportion of femoral muscle was highest in (ii). [From En summ.] AJDW

## 66

Enterotoxicogenicity of *Staphylococcus aureus* strains isolated from chickens.

Shiozawa, K.; Kato, E.; Shimizu, A.  
*Journal of Food Protection* 43 (9) 683-685 (1980)  
 [17 ref. En] [Dep. of Public Health, Hokkaido Univ., Sapporo 060, Japan]

To determine whether *S. aureus* strains isolated from chickens were potential causes of human intoxications, 586 strains from diseased and healthy chickens obtained from 52 farms in several districts of Japan were examined. Of these, 16 strains produced staphylococcal enterotoxins. One-half of the enterotoxicogenic strains were isolated from diseased chickens exclusively suffering from vesicular dermatitis, and another half were from healthy chickens. The enterotoxin types D and C were dominant in the strains from diseased and healthy chickens, resp. The enterotoxicogenic strains differed from the nonenterotoxicogenic strains in several of their biochemical properties, and in their susceptibility to International human phages, and insusceptibility to Shimizu's avian phages group I which lyse most of the staphylococci of chicken origin. These differences may suggest that the enterotoxicogenic strains of chicken origin were proper to humans but not to chickens. AS

## 67

[Studies on the growth of skeletal muscle of capons.]

I. Effects of castration on the weights of skeletal muscle, abdominal fat, intermuscular fat, skin, bone and viscera.]  
 Ono, Y.; Iwamoto, H.; Takahara, H.; Okamoto, M.  
*Science Bulletin of the Faculty of Agriculture, Kyushu University* 34 (1/2) 39-46 (1980) [18 ref. Ja, en]  
 [Lab. of Anim. Husbandry II, Kyushu Univ. 46-06, Fukuoka 812, Japan]

Studies were conducted on New Hampshire (NH) and Barred Plymouth Rock (BPR) cocks and capons, and on BPR capons treated with testosterone propionate. Live wt. and wt. of skeletal muscle, abdominal fat, intermuscular fat, skin, bone and viscera were determined at 20, 30 and 31 wk of age; tables and graphs of results are given. Live wt. of cocks and capons did not differ significantly; however, testosterone treatment increased the live wt. of capons to values significantly greater than those of untreated capons or cocks. Capons had lower skeletal muscle wt. than cocks; this effect could be eliminated by testosterone treatment. Castration considerably increased abdominal and intermuscular fat wt.; testosterone treatment reduced the higher fat wt. of capons, but they remained higher than those for cocks. Skin wt. tended to be higher in capons than in cocks. No significant effects of castration or testosterone treatment on bone or viscera wt. were observed. [From En summ.] AJDW

**Role of triglycerides and phospholipids on development of rancidity in model meat systems during frozen storage.**

Igene, J. O.; Pearson, A. M.; Dugan, L. R., Jr.; Price, J. F.  
*Food Chemistry* 5 (4) 263-276 (1980) [21 ref. En][Dep. of Food Sci. & Human Nutr., Michigan State Univ., E. Lansing, Michigan 48824, USA]

The effect of triglycerides (TG), phospholipids (PL) and total lipids (L) on development of rancidity during 8 months frozen storage at -18°C was studied, using lipid-free muscle fibres in combination with added TG, PL and L (beef muscle fibre with 0.8% PL, 9.2% TG and 10% L, chicken dark meat and white meat with 0.7% PL, 4.3% TG and 5.0% L). Tabulated results showed that added PL greatly increased TBA (thiobarbituric acid) values. Oxidation took place in 2 stages: PL were the first to oxidize, their rate of oxidation decreasing with time. Oxidation of TG began only after a prolonged induction period. Results demonstrated that both TG and PL contribute to development of rancidity, although PL make the greatest contribution. The influence of TG was shown to depend on the degree of unsaturation and the length of time in frozen storage. The relationship between oxidation of the polyunsaturated fatty acids of the phospholipids and development of rancidity was confirmed. AS

[**Use of krill meal in feeds for broilers.**] Der Einsatz von Krillmehl im Alleinfutter für Masthühnerküken (Broiler).

Vogt, H.; Harnisch, S.; Krieg, R.; Torges, H.-G.; Rauch, H. W.

*Archiv für Geflügelkunde* 44 (4) 141-149 (1980) [19 ref. De, en, fr, ru][Inst. für Tierzucht, Bundesforschungsanstalt für Landw., Braunschweig -Völkenrode, Celle, Federal Republic of Germany]

3 feeding trials were conducted, using groups of 1-day-old Lohmann broiler chicks, fed diets with ≤18% krill meal up to slaughter at 6 or 7 wk of age. Tables of data are given for growth rate of the broilers, and for organoleptic properties of the carcass. The results show that dietary krill meal levels >3% depressed growth, partly as a result of reduced feed intake. Adverse effects of dietary fish meal on the organoleptic properties of the broiler meat were observed, a 'fishy' off-flavour being present. AJDW

**A note on scanning electron microscopic assessment of stomach action on chicken skin.**

Thomas, C. J.; McMeekin, T. A.

*Journal of Applied Bacteriology* 49 (2) 339-344 (1980) [12 ref. En][Dep. of Agric. Sci., Univ. of Tasmania, GPO Box 252C, Hobart, Tasmania, 7001, Australia]

Scanning electron microscopy was used in conjunction with normal microbiological procedures to evaluate the stomach as a means of recovering bacteria from chicken skin. Stomaching removed most bacteria from the skin and viable counts of skin

microorganisms obtained by this method were not significantly different from those obtained by blending. The stomach represents a useful alternative to blending techniques commonly used to assess contamination of poultry carcasses. AS

**Intestinal fragility during ochratoxicosis and aflatoxicosis in broiler chickens.**

Warren, M. F.; Hamilton, P. B.

*Applied and Environmental Microbiology* 40 (3) 641-645 (1980) [21 ref. En][Dep. of Poultry Sci., N. Carolina State Univ., Raleigh, N. Carolina 27650, USA]

Results are presented showing that dietary ochratoxin reduces the breaking strength of the large intestine of chickens, whereas dietary aflatoxin has no such effect. These results are discussed in relation to possible problems with contamination and consequent condemnation of carcasses as a result of rupture of the large intestine during handling; a field study showed a high incidence of ruptured large intestines in a group of chickens fed ochratoxin-contaminated feed. AJDW

**Delayed secondary enrichment for the isolation of salmonellae from broiler chickens and their environment.**

Rigby, C. E.; Pettit, J. R.

*Applied and Environmental Microbiology* 40 (4) 783-786 (1980) [11 ref. En][Agric. Canada, Anim. Diseases Res. Inst., Nepean, Ontario K2H 8P9, Canada]

Specimens collected from 6 broiler flocks were cultured for salmonellae by 3 methods. For direct enrichment, the specimen was homogenized, and 1 ml of the homogenate was inoculated into tetrathionate-brilliant green broth; for preenrichment, liquid specimens and homogenates were incubated at 37°C, and on the next day 1 ml was inoculated into tetrathionate-brilliant green broth; and for delayed secondary enrichment, incubated preenrichment cultures were held at room temp. for 7-10 days and then subcultured to fresh tetrathionate-brilliant green broth. All tetrathionate-brilliant green broth cultures were incubated at 42°C for 24-48 h before plating. Significantly more isolations of salmonellae were obtained by delayed secondary enrichment than by direct enrichment or preenrichment. Salmonellae were isolated from 417 of 2283 (18.3%) samples of litter, intestinal contents, and faeces cultured by all 3 methods. Of these positive specimens, direct enrichment detected 208 (49.9%), preenrichment detected 282 (67.6%), and delayed secondary enrichment detected 373 (89.4%). Of 896 specimens of swabs and rinse fluids that were cultured by preenrichment and delayed secondary enrichment, 259 (28.9%) yielded salmonellae. Delayed secondary enrichment detected 254 (98.1%) of these, and preenrichment detected 147 (56.8%). A total of 23 serotypes of salmonellae were identified. The greater effectiveness of delayed secondary enrichment for the isolation of salmonellae was not likely, due to the selection of certain serotypes or to an increased inhibition of competing flora. AS

73

**Investigations on the extraneous water content of frozen poultry carcasses.**

Ehinger, F.; Thomson, J. E.

*Archiv für Geflügelkunde* 44 (4) 149-157 (1980)  
[25 ref. En, de, fr, ru] [Univ. Hohenheim, Postfach 106,  
7000 Stuttgart 70, Federal Republic of Germany]

110 broiler carcasses were taken from a processing line after slaughter, bleeding, scalding, plucking and removal of heads and feet. They were dried thoroughly with paper towels, enucleated, the peeled gizzard, heart and liver were returned to the body cavity, the carcasses were weighed, and 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10% water was added into the body cavity. The carcasses were then packaged in plastic bags, frozen at -16°C, and stored at -10°C. After thawing, the wt. loss during storage was determined, together with the extraneous water content, fat content and protein content of the stored carcasses. Tables of results are given, together with correlations between various characteristics of the carcasses before and after addition of extraneous water and freezing. Regressions of physiological water content of carcasses on various carcass characteristics are presented. The most useful regressions for estimation of physiological water content were the water:protein regression ( $r = 0.968$ ), the water:sat-free DM regression ( $r = 0.994$ ), the water:protein-fat ratio regression ( $r = 0.899$ ), and the multiple regressions between water and protein content + carcass wt ( $r = 0.973$ ), and between water and protein content + fat content + carcass wt ( $r = 0.979$ ). EEC regulations for the extraneous moisture content of poultry are discussed. AJDW

74

[Physico-chemical properties of hen fat.]

Tsimbalova, N. M.; Korizhskaya, L. V.; Kudin, A. E.; Lutsenko, V. A.; Gorshkova, E. I.

*Pishchevaya Promyshlennost', Respublikanskii Mezhvedomstvennyi Nauchno-tehnicheskii Sbornik* No. 26, 61-63 (1980) [3 ref. Ru]

GLC was used to determine total fatty acids in hen fat. Linoleic, linolenic and arachidonic acids were determined by alkali isomerization with subsequent spectrophotometric measurement in the UV zone; melting temp. of the fat was also determined. There is approx. 3 x less stearic acid and approx. the same level of palmitic acid as in other animal fats. Linoleic acid concn. is 6-12 x higher than in beef fat, and 2-5 x higher than in lard. Due to its fatty acid composition, hen fat has high nutritional value and is recommended for use in foods, or as an enriching constituent for milk or other fats. Its melting point fluctuates between 19° and 24°C, depending on the season. STI

75

**Several experiences of investigations with drug residues on groups of pigs and broiler-chickens bred by large-scale farming.** [Lecture]

Mailath, F. P.; Sohar, J.; Leder, I.; Cieleszky, V.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 1.8:47-1.8:52 (1979) [En, de, fr, ru] [Inst. of Nutr., Budapest, Hungary]

Groups of 80 pigs (age and breed not stated) received a 0, 25 or 50 mg Carbadox/kg ration for 8 wk. Contents of Carbadox were determined during administration and ≤ 40 days after its cessation in liver, kidneys, thigh muscles and skeletal muscles of the pigs. Accumulation in the tissues was much more marked with the 50 mg than with the 25 mg dose; with both, contents decreased in the order of tissues named, only traces being present in the muscles with the 25 mg dose and ≤ 100 µg/kg with the 50-mg dose. Carbadox traces persisted in liver and kidney for ≤ 20 days after cessation of administration. Groups of broiler chickens (no details given) received rations containing 0, 40 or 400 mg decoquinate/kg for 60 days. Contents of the coccidiostat were determined (i) directly after cessation of administration, and (ii) 3 days later, in breast muscles, thigh muscles, kidney, gizzard, heart, liver and skin + underlying fat. The results are graphically presented. (i) concn. increased in the order of tissues named from about 0.1 mg to about 5 mg/kg with the 400-mg dose. (ii) concn. were markedly lower, but persisted at (i) level in the skin and fat. [See FSTA (1981) 13 5S668.] SKK

76

**Mineral composition of meat being hand or mechanically separated from bones.** [Lecture]

Djurovic, I.; Djordjevic, V.; Mihajlovic, B.; Radovic, N. *Proceedings of the European Meeting of Meat Research Workers* No. 25, 11.4:857-11.4:862 (1979) [19 ref. En, de, fr, ru] [Yugoslav Inst. of Meat Tech., Belgrade, Yugoslavia]

This paper deals with analysis of the mineral composition of meat separated from bones mechanically or by hand, and derived from various regions of pig, cattle and chicken carcasses. A total of 144 samples was analysed for Ca, Mg, Fe, Ni, Na, K, P, Co, Mn, Se, Sn, Hg, Cd, Pb, Zn, Cu, Sb and arsenic; contents of water and ash were also determined. The results show that there are considerable differences in mineral composition among the examined kinds of manually or mechanically deboned meat. [See FSTA (1981) 13 5S668.] STI

77

**Improved method for gas-liquid chromatographic determination of clopidol in chicken tissues.**

Suzuki, E.; Matsuda, M.; Momose, A.; Namekata, M.

*Journal of the Association of Official Analytical Chemists* 63 (6) 1211-1214 (1980) [4 ref. En] [Lab. of Racing Chem. 4-37-6 Kamiyoga, Setagaya-ku, Tokyo 158, Japan]

A sensitive and specific GLC method has been developed for determining low levels of the coccidiostat clopidol in chicken tissues. Clopidol is extracted from the tissues with methanol, and cleaned up on an alumina-column and an anion exchange resin column with 0.1% acetic acid-methanol as eluant. Clopidol is methylated with diazomethane, and then determined by GLC. 2,4-dinitro-1-chlorobenzene is used as an internal standard. The method is applicable to levels as low as 2 parts/billion (p.p.b.) in chicken tissues. Recoveries of 2-20 p.p.b. clopidol added to tissues averaged 87% for muscle, 84% for liver, 80% for kidney, and 76% for fat. AS

78

**Quality properties of meat derived from broilers of different age.** [Lecture]

Kralik, G.; Petricevic, A.; Sabljic, B.; Tomic, D.  
*Proceedings of the European Meeting of Meat Research Workers* No. 25, 3.9:141-3.9:146 (1979)  
[19 ref. En, de, fr, ru] [BTZNC Poljoprivredni Fak., Osijek & Mesna Ind. "Belje" PIK, Yugoslavia]

The proportion of carcass parts (breast, drumsticks, wings and back) in Hybro broilers slaughtered at 6, 7 or 8 wk of age was investigated, together with contents of moisture, fat, protein, ash, tryptophan and hydroxyproline in light and dark meat. The results show statistically significant differences in the proportion of carcass parts in and the composition of meat of broilers slaughtered at different ages; selection of the optimum slaughter age is discussed. [See FSTA (1981) 13 5S668.] STI

79

**[Influences of cooling and freezing on the biochemical, physical and sensory criteria of the meat quality of broilers.] Einfluss der Kühlung und des Einfrierens auf biochemische, physikalische und sensorische Kriterien der Fleischbeschaffenheit bei Broilern.** [Lecture]

Ristic, M.; Kijowski, J.; Schön, L.  
*Proceedings of the European Meeting of Meat Research Workers* No. 25, 4.5:179-4.5:185 (1979) [De, en, fr, ru] Bundesanstalt für Fleischforschung, Kulmbach, Federal Republic of Germany]

Studies were conducted on 90 samples of breast muscle of Lohmann broilers slaughtered at 39 days of age, 1 h after transport for 150 km (transport time approx. 2 h). Comparative studies were conducted before cooling, after air cooling, after water cooling (approx. 3 h post mortem), after freezing at -40°C, and after thawing (45 h at 4°C). Characteristics studied included ATP concn., R-value, sarcomere length, water binding capacity, drip loss, pH, Göfo value, rigor value, grilling loss, shear value, juiciness, tenderness, flavour and colour. ATP concn. was highest before cooling, lowest in thawed samples. Sarcomere length was greatest after thawing. Lowest final pH and highest drip loss were recorded in air-cooled carcasses. 3 h air cooling of pre-rigor carcasses tended to give inferior frozen product quality to non-cooled or water-cooled samples. [See FSTA (1981) 13 5S668.] STI

80

**Effect of temperature stress on the levels of glycogen in muscles and c 3,5-AMP in the muscles and adipose tissue of hens.** [Lecture]

Faltas, A.; Stachnev, F.; Nestorov, N.  
*Proceedings of the European Meeting of Meat Research Workers* No. 25, 4.14:233-4.14:239 (1979)  
[27 ref. En, de, fr, ru] [Meat Tech. Res. Inst., Sofia, Bulgaria]

The stress reaction in hens exposed to high temp. was investigated, together with the interrelation of glycogen concn. in muscles and cyclic AMP concn. in the muscles and adipose tissue. 20 sexually immature hens were studied. The results show that subjecting the hens to temp. stress at 40°C for 150 min significantly increases cyclic AMP concn. in the muscle and adipose tissue, and decreases glycogen concn. in the muscle tissue. [See FSTA (1981) 13 5S668.] STI

81

**[CO<sub>2</sub> stunning of broilers.]** [Lecture]

Bogdanov, I.; Bogdanova, Ts.; Mitkov, S.  
*Proceedings of the European Meeting of Meat Research Workers* No. 25, 2.1:73-2.1:79 (1979) [Ru, en, de, fr] [Inst. Myasnoi Promyshlennosti, Sofia, Bulgaria]

Studies were conducted to determine optimum CO<sub>2</sub> concn. and treatment time for stunning of 60-day-old broilers. Behaviour of the broilers was studied during and after stunning, to evaluate the depth and duration of anaesthesia induced. On the basis of the results, the following stunning conditions are recommended: CO<sub>2</sub> concn. 27-28%, pressure 1.5 atm and exposure time 90 s. [See FSTA (1981) 13 5S668.] STI

82

**The composition of meat of broiler chicks feed rations in which soybean meal was substituted with cottonseed meal.**

Hamza, A.; Hejja, S.  
*Beiträge zur Tropischen Landwirtschaft und Veterinärmedizin* 18 (2) 153-158 (1980) [17 ref. En, de, fr, es, ru] [Fac. of Agric., Monsoura Univ., Monsoura, Egypt]

The effect of replacement of soybean meal by cottonseed meal in the diet on the proximate composition and the amino acid composition of broiler breast and thigh meat was investigated. The control diet contained 24.7% soybean meal. Tabulated results showed no significant differences when 12.0, 15.0 and 18.0% cottonseed meal was substituted for soybean meal. RM

83

**Yield of edible meat from broiler crossbreds at ten weeks of age.**

Elaganathan, V.; Kosalaraman, V. R.; Ranga Reddy, P.  
*Cheiron* 9 (3) 153-157 (1980) [7 ref. En] [Poultry Res. Sta., Madras-35, India]

Studies on the edible meat yield of 5 broiler strains (2 white Cornish, 1 Red Cornish, 1 New Hampshire and 1 White Rock) and their crossbreds, all slaughtered at 10 wk of age, are described. Tables of data are given for % mean edible meat yield in the breast, legs, wings, and back + neck, and in the whole oven-ready carcass. Mean values for purebreds, crossbreds and overall means were, resp. (%): breast 81.8, 83.2 and 82.9; legs 77.6, 79.0 and 78.7; wings 62.3, 63.6 and 63.3; back + neck 54.2, 55.1 and 54.9; and whole carcass 70.1, 71.3 and 71.0. In general, Cornish crosses had the highest edible meat %. AJDW

84

**[Qualitative changes in poultry meat under cryogenic freezing.] [Lecture]**

Venger, K. P.; Kaukhcheshvili, E. I.; Mazurenko, N. P.; Khlebnikov, V. I.; Abramova, L. A.

*Proceedings of the European Meeting of Meat Research Workers* No. 25, 7.24:677-7.24:682 (1979)  
[7 ref. Ru, en, de, fr] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

Changes in quality of broilers frozen at high rates (3-5 cm/h) by immersion in freon-12 are considered; studies were conducted on broilers (unpackaged, or packaged in heat shrinkable film) frozen from an initial temp. of 25°C to a core temp. of -8°C in the pectoral muscle. Samples were evaluated immediately after freezing, or after storage at -30°C. Results for non-packaged broilers show adsorption of freon to occur. This freon evaporates gradually during frozen storage; thawing increases the freon desorption rate by a factor of approx. 5. Cooking results in complete elimination of the freon; no freon was detectable in the broth from cooked broilers. Prior packaging in shrink-film prevented freon adsorption by the broilers. [See FSTA (1981) 13 5S668.] STI

85

**[Extending the shelf life of fresh meat in controlled atmospheres.] Zur Problematik der Verlängerung der Haltbarkeit von Frischfleisch in kontrollierten Atmosphären.**

Partmann, W.

*Schlachten und Vermarkten* 80 (10) 305-309 (1980)  
[10 ref. De, en, fr] [Bundesforschungsanstalt für Ernährung, Engesserstrasse 20, 7500 Karlsruhe 1, Federal Republic of Germany]

400 beef steaks, 180 veal and 180 pork chops and the 2 halves of 120 freshly slaughtered broilers were packaged in high-density polyethylene (HDPE) bags, (50 µm) at a slight excess pressure of air, 80% N<sub>2</sub> + 20% CO<sub>2</sub> or pure CO<sub>2</sub> and stored for up to 6 wk at +1°C in impermeable containers in 1.8 bar excess pressure of the same atm. Controls were vacuum-packed in Hostaphan-polyethylene (12/50 µm) bags and stored at -70°C. Samples were examined at 2 wk intervals. Of the air-packed samples, beef steaks had turned brownish-red after 4 wk and were unfit for sale, using microbiological, chemical (pH, free amino acids) and sensory criteria; most of the broiler halves and pork and veal chops were spoilt after 2 wk storage. In the mixed CO<sub>2</sub> atm, the quality of beef steak was still satisfactory after 6 wk, that of the other samples after 4 wk storage. In pure CO<sub>2</sub>, all samples of beef, pork and veal could be stored for 6 wk without loss of quality. Pure CO<sub>2</sub> also gave the best results when samples were unwrapped and then stored under ordinary refrigeration: broilers stored for 4 wk in pure CO<sub>2</sub> maintained their quality during 5 days of subsequent storage at 4°C, while those kept in mixed CO<sub>2</sub>-N<sub>2</sub> atm showed rapid deterioration. RM

86

**[Trends in meat smoking technology.]**

Quaglia, G. B.

*Industrie Alimentari* 19 (11) 833-835 (1980) [It]

In this general survey, aspects discussed include the importance of such quality factors as pretreatment (e. salting), source and circulation of smoke, moisture content, time and temp. of drying, antimicrobial action of approx. 200 chemical constituents of woodsmoke and their antioxidant properties, mechanism of colour formation in smoked products of 6-10% moisture content, and characteristic aroma attributable to phenolic compounds. Latest technology substitutes liquid extracts of smoke for the traditional process; it is quicker, cheaper, removes tarry or sooty odours, and obviates development of 2 groups of possibly carcinogenic compounds (polycyclic aromatic hydrocarbons and nitrosamines) on product surface. Production line adaptations of the extracts for (i) bacon meat and chicken, and (ii) fish, are detailed, giving wt. loss (i) 0.9-1.0%, (ii) 5-7% (with hot air in conditioning tunnel) or 0-2% (with cold air), vs. 6.5-7.5% and 12-15% for (i) and (ii) resp., using traditional methods). The technology also employs vacuum techniques, the cold chain, and electrostatic precipitation (e.g. Volstatic equipment) of mixtures of smoke extracts. Salting and smoking can be performed in one operation. It is also applicable for potato products. KME

87

**Effects of feed restriction during the laying period on the performance of two strains of mature caged commercial layers in the humid tropics.**

Benyi, K.; Akinokun, O.; Lebbie, S. H. B.

*Journal of Agricultural Science, UK* 96 (1) 195-203 (1981) [34 ref. En] [Dep. of Anim. Sci., Univ. of Ife, Ile-Ife, Nigeria]

148 birds each of 2 strains (SB 511 and B 390) of commercial layers, 42 wk old, were fed ad lib., and 85 and 70% of ad lib., for five 28-day periods to study the effects of feed restriction, strain, period and interaction effects on body wt. gain, carcass characteristics (dressing % and abdominal fat) and mortality in the humid tropics. There were significant effects ( $P < 0.01$ ) of strain on all traits except dressing %, and of feed restriction on all traits except dressing % and mortality. Feed restriction to 70% of ad lib. reduced egg production, egg wt., body wt. and feed consumption and improved feed efficiency. There were no differences between ad lib. and 85% ad lib. feeding. Strain x treatment interaction had significant effects on egg production and feed efficiency. AL

88

**[Storage of poultry, and changes during storage.] Lagerung und Lagerveränderungen von Geflügel.**

Ristic, M.  
*Fleischwirtschaft* 60 (9) 1607-1608, 1610, 1612-1614, 1616, 1618, 1620, 1622; 1693-1694 (1980) [many ref. De, En] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]  
Various methods of treatment were tested on

2630 broilers, and their storage properties determined during fresh storage, long-term (frozen) storage, after freezing, defrosting and refreezing, and storage of fresh or frozen joints; the effects of thawing methods on meat quality were also evaluated. Criteria used were physical, chemical, sensory and bacteriological properties, and wt. loss. Results are fully reported in diagrams and tables, showing that storage time and temp. are the main factors determining quality deterioration, but that treatment of animals or carcasses before and after slaughter, as well as chilling and freezing effects during storage, can have an adverse influence on the products. Recommended max. storage times are given for various storage methods and conditions. RM

## 89

[Investigation into the carry-over of T-2 toxin in chickens.] Untersuchung zum Carry-over von T-2 Toxin bei Hühnern.

Hofmann, G.

*Fleischwirtschaft* 60 (10) 1908-1910 (1980) [many ref. De, en]

The carry-over of *Fusarium solani* T-2 toxin from the feed into edible tissues of chickens was investigated. No carry-over was observed in broilers fed ad lib. with a diet containing 15 p.p.m. of the toxin. The detection limit of the analytical method was 15 parts/billion T-2 toxin in muscle and liver tissue. When adult birds (roosters) ingested rapidly a large amount of the toxin, it reached max. concn. in the liver within 2-3 h but disappeared within 4½ h after ingestion. HT-2 toxin was detected as a metabolite of T-2 toxin for a few h (3-4½ h after ingestion). AS

## 90

[Evaluation of use of krill meal in fattening diets for broilers.]

Uzieblo, L.; Danczak, A.; Tarasewicz, Z.;

Fijalkowski, Z.; Fijalkowska, M.; Wisniewska, I.

*Roczniki Naukowe Zootechniki* 7 (1) 255-269 (1980)

[6 ref. Pl, en, ru] [Inst. Hodowli i Tech. Produkcji

Zwierzej Akad. Rolniczej, Szczecin, Poland]

A total of 2196 Euribrid broilers was used in a feeding trial conducted to evaluate effects of starter diets containing 2.5-9% krill meal and finisher diets containing 2-8% krill meal on performance, carcass quality and meat quality. Trials were conducted with both pink and beige batches of krill meal. Tables of results are given for growth characteristics, slaughter yield (with and without giblets), wt. and % of giblets, eviscerated carcass wt., wt. and % of skin, wt. and % of breast and leg cuts (with and without bones), and chemical composition (DM, crude protein, ether extract, ash), aroma and palatability of the meat. The results show that the diets studied did not significantly influence the carcass characteristics or meat composition; high levels of dietary krill meal adversely affected the organoleptic properties of meat of some broilers. AJDW

## 91

[Tiamulin, a new antibiotic in veterinary medicine.]

[Review]

Carli, S.; Giulioni, A.

*Rivista di Zootecnica e Veterinaria* No. 4, 251-266

(1980) [43 ref. It, en] [Istituto di Farmacologia, Tossicologia & Terapia Sperimentale Vet., Univ. degli Studi di Milano, Milan, Italy]

This review on the antimicrobial activity, mode of action, toxicity, metabolism and applications of the new semisynthetic diterpene antibiotic tiamulin includes tables of literature data for persistence of tiamulin residues in edible tissues of treated pigs and chickens. AJDW

## 92

[Effect of culinary treatment of poultry meat on final content of chlorinated pesticide residues.]

Uhnak, J.; Szokolay, A.; Sackmauerova, M.

*Prumysl Potravin* 31 (5) 292-294 (1980) [21 ref. Sk]

[Vyskumný Ustav Preventívneho Lekarstva, Bratislava, Czechoslovakia]

Laying hens were given a ration containing/kg 1 mg hexachlorobenzene and 1 mg each of 4 BHC isomers; and chickens were given a ration containing 50 mg hexachlorobenzene/kg. Duration of feeding is not stated. Meat of layers and chicken was boiled customarily for 120 min or cooked in a pressure cooker for 30 min; or was roasted using vitamin-E fortified oil for 120 min at 150°C in an electric oven. The results with layers' meat are briefly described, mainly from the viewpoint of appearance of pesticide metabolites. Findings with chicken meat are tabulated in detail. They

include the following values (mg/kg) for contents in raw and cooked meat, in fat of raw and cooked meat, and in DM of raw and cooked meat resp.: hexachlorobenzene, 6.2 and 20.8, 445 and 547, and 25.9 and 53.5; 2.4-dichlorophenol, 0.02 and 0.1, 1.4 and 2.6, and 0.08 and 0.25; 1,2,4,5-tetrachlorobenzene, 0.9 and 0.6, 64.6 and 15.7, and 3.8 and 1.5; 2,4,6-trichlorophenol 2.2 and 1.9, 157 and 50.7, and 9.1 and 5.0; pentachlorophenol, 0.04 and 0.05, 2.3 and 1.3, and 0.17 and 0.13; and pentachlorobenzene, 0.01 and 0.01, 0.43 and 0.32, and 0.03 and 0.03. Corresponding values for roast meat (raw meat values being as stated) were resp. in the same order of compounds: 36.2, 548 and 86.1; 0.08, 1.2 and 0.18; 0.43, 6.7 and 1.0; 4.1, 62 and 9.8; 0.02, 0.32 and 0.05; and 0.01, 0.08 and 0.01. Values for contents in aqueous and fatty phases of cooking broth are tabulated; and for contents in pan-frying (sometimes used) and for effects of roasting and frying on vitamin E content of the oil used are graphically presented. Methods for metabolite identification are described. SKK

## 93

[The composition of chicken fricassee.]

Zusammensetzung von Hühnerfricassee.

Jöckel, J.; Hahn, A.; Thein, G.; Hildebrandt, G.

*Fleischwirtschaft* 60 (10) 1828, 1830, 1832-1834, 1837-

1839; 1887 (1980) [8 ref. De, en] [Landesanstalt für

Veterinärmed. & Lebensmittelhygiene, D-1000 Berlin 21]

An attempt was made to develop quality standards for the composition of chicken fricassee by evaluating cookery books and scientific literature, combined with model experiments and questionnaires. Critical assessment of the material produced the following 5 requirements: chicken fricassee consists of cooked chicken meat without skin, bone or giblets, in a pale, thickened, mildly acid sauce with optional addition of mushrooms and/or asparagus; a proportion of turkey meat may be included, provided it is declared; the canned or frozen product must contain the equivalent of  $\geq 35\%$  fresh skeletal muscle (a single sample  $\geq 30\%$ , 5 random samples  $\geq 33\%$  lean meat); wt. loss due to heating does not justify falling below this limit; meat balls may be added as supplement or refinement, but cannot replace poultry meat. Changes to the sauce base or added vegetables or mushrooms must not be made at the expense of the meat portion. Products with reduced meat content cannot be distributed as "fricassee" even in compound words. To provide guidance to manufacturers on meat yields and substance losses in standard fricassee, model experiments investigated the effects of cooking method, sterilization effect, chicken wt. class and wt. of meat used. It was found that a dressed roasting chicken was about 45% usable skeletal muscle in the uncooked state. During cooking and sterilization there was a total loss of 33.3–41.8%. [Continued in following abstr.] AS

## 94

### [The composition of chicken fricassee.]

Zusammensetzung von Hühnerfrikassee.

Jöckel, J.; Hahn, A.; Thein, G.; Hildebrandt, G.

*Fleischwirtschaft* 60 (10) 1828, 1830, 1832–1834, 1837–1839; 1887 (1980) [8 ref. De, en] [Landesanstalt für

Veterinärmed. & Lebensmittelhygiene, D-1000 Berlin 21]

[Continued from preceding abstr.] This evened out during autoclaving, the relatively smaller cooking loss from heavier birds being largely balanced by increased sterilization loss. However, the effects of 4 different cooking methods (water at 85° or 97°C, steam at 85° or 115°C) could not be levelled by the sterilization effect. The close linear relationship between initial and final wt. of meat in the canned products suggests that the product is easy to standardize and that the preparation technique is sufficiently accurate and representative. AS

## 95

### [A new enzymic method for determining starch in foods.] Eine neue enzymatische Stärkebestimmung für Lebensmittel. [Lecture]

Ettel, W.

*Alimenta* 20 (1) 7–11 (1981) [13 ref. De, en] [Kantonale Lab. Zug, CH-6312 Steinhausen, Switzerland]

A new enzymic method is presented for detn. of starch in food. 'Total starch' is defined as the amount of  $\alpha$ -glucan insoluble in 80% ethanol and hydrolysed to glucose by amyloglucosidase. In the same centrifuge tube, starch is extracted with 80% ethanol, solubilized with 0.5N NaOH and hydrolysed by amyloglucosidase at 60°C. Glucose is estimated by the hexokinase test

(involving oxidation of glucose-6-phosphate by G-6-P dehydrogenase and NADP, and UV photometric detn. of NADPH at 340 nm). Starch content is calculated from glucose  $\times 0.9$ . Sample wt. should be  $\leq 2$  g, with  $\leq 400$  mg starch. The method has great practical advantages over the Boehringer method. The repeatability and reproducibility of the method was confirmed in collaborative analyses of native starch (coeff. of variation 0.5%), wheat germ (1.4%) and cream of chicken soup (0.9%). Details of collaborative studies will be published later. [From En summ.] [See also preceding and following abstr.] RM

## 96

### Effects of varying dietary protein and energy levels on growth rate and body fat of broilers.

Hargis, P. H.; Creger, C. R.

*Poultry Science* 59 (7) 1499–1504 (1980) [9 ref. En]

[Dep. of Poultry Sci., Texas Agric. Exp. Sta., Texas A & M Univ., College Station, Texas 77843, USA]

3 experiments were conducted in which the protein and energy levels varied in an attempt to produce broiler carcasses with more acceptable fat deposition at market age. Male broilers had more abdominal fat than female broilers up to 46 days of age. Females deposited abdominal fat at a rate greater than that of the males after 46 days of age. A significant % of the wt. gain after 46 days was in the form of abdominal fat in the female. Feeding no supplemental fat in the diet for the first 7 days resulted in a decrease in the % of abdominal fat at 49 days of age. High dietary protein levels were detrimental to growth during the starting period (0–14 days) but beneficial in maximizing gain and feed efficiency during the finishing period (28–49 days). Feeding no supplemental fat for the first 7 days of age, regardless of the energy level of the finisher, produced the least abdominal fat of all diets fed to 49 days. More abdominal fat was produced when supplemental fat was withheld for 0–10 days or 0–14 days of age. AS

## 97

### Test for predicting the condition of broiler meat.

Niewiarowicz, A.; Pikul, J.

*Poultry International* 19 (1) 54, 56, 96, 100 (1980) [En, de, fr, it, ja, ar, es] [Inst. of Anim. Products Tech., Acad. of Agric., Poznan, Poland]

Studies on the pale soft exudative (PSE) and dark firm dry (DFD) defects of breast muscle of broilers are described, with special reference to classification on the basis of muscle pH (5.6–5.7 for PSE birds, 6.4–6.7 for DFD birds); normal muscles have pH 5.9–6.2, muscle samples with pH of 5.8 and 6.3 being intermediate in quality between PSE or DFD and normal muscle resp. Studies over 5 yr showed incidence of PSE to be approx. 6%, with a further 4% with muscle pH 5.8. Incidence of DFD was approx. 5%. In the warm period of the year, incidence of PSE rose to 12%, with a further 8% of birds with muscle pH 5.8. 150 broilers, 8–9 wk of age, were used in a study on the possible use of skin pH of the live bird for prediction of postmortem muscle pH and hence the predisposition to PSE or DFD. A graph is given showing the correlation between pre-slaughter

skin pH and the muscle pH 15 min post mortem; the correlation is  $r = 0.73$ . It is concluded that live bird skin pH of 6.5-6.6 or 7.0-7.1 indicate high probabilities of the PSE and DFD defects resp. AJDW

## 98

**An investigation of the genetic toxicology of irradiated foodstuffs using short-term test systems. I. Digestion in vitro and the testing of digests in the *Salmonella typhimurium* reverse mutation test**  
 Phillips, B. J.; Kranz, E.; Elias, P. S.; Münzner, R.  
*Food and Cosmetics Toxicology* 18 (4) 371-375 (1980)  
 [10 ref. En] [Int. Federal Res. Cent. for Nutr., Postfach 3640, D-7500 Karlsruhe, Federal Republic of Germany]

The genetic toxicology of irradiated foodstuffs has been investigated by the use of a battery of short-term tests for genetic damage. This paper discusses appropriate methods for the preparation of food samples for testing by techniques involving microorganisms and mammalian cells in culture. A new method of sample preparation by enzymic digestion in vitro is described and its use in the testing of three irradiated foodstuffs (dried dates, cod and chicken) by the *Salmonella typhimurium* reverse mutation test is reported. The results of the mutation tests provide further evidence of the lack of genetic toxicity of irradiated foods. AS

## 99

[Survey of pollution with polychlorinated biphenyls in Tokyo. VI. Polychlorinated biphenyl content of foods.]

Yamazaki, K.; Yamanobe, H.; Suzuki, S.; Harada, H.  
*Annual Report of Tokyo Metropolitan Research Laboratory of Public Health* 29 (1) 234-237 (1978)  
 [5 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

Data are given for the polychlorinated biphenyl (PCB) content of foods collected from markets and small shops in Tokyo over the period April 1977-May 1978. Mean values and ranges (with number of samples in parentheses) for various foods were (p.p.m. wet wt basis): fish muscle (156) 0.03 and 0.00-0.55; fish internal organs (151) 0.17 and 0.00-5.37; butter (5) 0.01 and 0.00-0.02; processed cheese (5) 0.01 and 0.00-0.01; milk (10) 0.00 and 0.00-0.01; chicken (3) 0.01 and 0.01-0.02; chicken liver (2) 0.01 and 0.00-0.01; and hens' egg (10) 0.00 and 0.00-0.01. No PCB was detectable in 5 samples of modified dried milk, 3 samples of pork, 2 samples of porcine liver, 2 samples of beef or 3 samples of bovine liver. AJDW

## 100

[Survey of pollution with polychlorinated biphenyls in Tokyo. VII. Polychlorinated biphenyl content of foods.]

Yamazaki, K.; Yamanobe, H.; Suzuki, S.; Harada, H.  
*Annual Report of Tokyo Metropolitan Research Laboratory of Public Health* 30 (1) 133-136 (1979)  
 [5 ref. Ja] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

The study of polychlorinated biphenyl (PCB) content in foods retailed in the Tokyo area [see preceding abstr. for part VI] was continued in April 1978-March 1979. Mean and ranges of PCB contents found (with numbers of samples in parentheses) were as follows: fish muscle (300 - 60 spp.) 0.05, 0.00-1.42 p.p.m. wet wt; fish internal organs (58) 0.68, 0.00-11.50 p.p.m. wet wt; butter (10) 0.01, 0.00-0.03 p.p.m. wet wt; processed cheese (10) 0.02, 0.00-0.09 p.p.m. extractable fat (EF); modified dried milk (10) 0.01, 0.00-0.04 p.p.m. EF; milk (20) 0.03, 0.00-0.07 p.p.m. EF; and hens' eggs (20) 0.00, 0.00-0.01. Mean contents in meat and liver from pigs, cattle and chickens were 0.00 p.p.m., (5 samples each) except chicken liver, 0.01 p.p.m., (occasional samples of each contained 0.1-0.2 p.p.m.). [From En tables.] DIH

## 101

**'Flexible' fried chicken forms a base for Banquet Foods' growing foodservice role.**

Peters, J. W.

*Food Product Development* 14 (2) 36, 40 (1980) [En]

Banquet Foods Corp. have developed a new precooked chicken product that food service operators can deep fry or cook in the oven since the proprietary dry/wet/dry breading system develops approx. the same colour and texture whichever way it is heated. The 'flexible fryer' is available in 3 var.: Regular, Buttermilk and Honey 'N Spice, and can be reconstituted in a conventional oven for 30-35 min, in a convection oven for 25-30 min or in a fryer for 8-10 min. VJG

## 102

[Effects of erucic acid present in dietary rapeseed on weight gain and carcass characteristics of broilers. Heritability and genetic correlations.]

Pilla, A. M.; Maria, C. de; Cosentino, E.

*Annali dell'Istituto Sperimentale per la Zootecnia* 12 (1) 27-41 (1979) [13 ref. It, en, fr] [Istituto di Produzione Anim., Fac. di Agraria, Portici, Italy]

687 New Hampshire broilers (representing 8 progeny groups) were fed from hatching up to 12 wk of age on diets containing (i) 3% rapeseed oil (48.3% erucic acid) or (ii) 3% corn oil. Data are given for wt. gain, carcass wt., wt. and % of liver, heart and abdominal fat, slaughter yield, and fatty acid composition of depot fat. Broilers fed (i) grew more slowly but had higher wt. and % of liver, heart and abdominal fat than those fed (ii); % carcass yield was higher for broilers fed (ii) than for those fed (i). Degree of accumulation of erucic acid into depot fat of broilers fed (i) differed between progeny groups. AJDW

## 103

**Thermal denaturation of proteins in post rigor muscle tissue as studied by differential scanning calorimetry.**

Stabursvik, E.; Martens, H.

*Journal of the Science of Food and Agriculture* 31 (10) 1034-1042 (1980) [18 ref. en] [Norwegian Food Res. Inst. PO Box 50, N-1432 Aas-NLH, Norway]

Post rigor bovine *M. semimembranosus* was analysed by differential scanning calorimetry (d.s.c.). After extractive removal of sarcoplasmic proteins, subsequent pH adjustment and manual connective tissue removal,

d.s.c. yielded reproducible thermograms which permitted investigation of the individual major myofibrillar proteins in various pH and salt environments without prior isolation. The positions of 2 major peaks, interpreted as myosin transitions, proved to be strongly pH dependent. At pH 5.4, the peak max. occurred at 58° and 65°C, resp., at a heating rate of 10°C/min. Above pH 6.5 their order of denaturation was reversed. In the pH range 5.4–6.5 the peak ascribed to actin had its max. near 80°C in intact muscle. Above this pH range it was displaced to lower temp. Thermal stability of actin was studied after treatment of muscle tissue with different salt solutions. At equal ionic strengths ( $\mu = 0.15$ ) at pH 5.5,  $\text{CaCl}_2$  and  $\text{NaCl}$  caused 6.5°C and 4°C displacement to lower temp., resp. The thermograms of bovine *semimembranosus* muscle were compared to those of 2 red and 2 white muscle types (bovine cardiac and rabbit *soleus* muscles, chicken breast and rabbit *semimembranosus* muscles, resp. at 2 pH levels). Greater myosin differences were found between red and white muscles than between muscles from different animal spp. All muscles gave similar actin transitions, with the exception of heart muscle where the actin peak appeared at 3°C lower temp. Necessity of strict pH control in order to obtain reproducible muscle thermograms is demonstrated. AS

## 104

**The use of transmission spectrophotometry for the evaluation of haem pigments in situ in muscle slices.**

Fransham, I.; Walters, C. L.

*Zeitschrift für Lebensmittel-Untersuchung und -Forschung* 172 (1) 4–8 (1981) [6 ref. En, de]

[Leatherhead Food Res. Ass., Leatherhead, Surrey, UK]

Localized discoloration in meat can be investigated using the method described for study of the nature of haem pigments in small areas of thin muscle slices. Meat is sliced to a thickness of 2 mm; these slices adhere to the sides of 10-mm spectrophotometer cells for transmission spectroscopy. Samples too fragile to be so sliced are flaked and the flakes are reformed into 'slices' in a special cell consisting of glass slides clamped to 2-mm spacers. Haem pigments are then studied by recording difference spectra (450–700 nm) against an identical slice that has been bleached with  $\text{H}_2\text{O}_2$ . Various chemical treatments are described for differentiation between haem pigments. Nitrosyl derivatives of myoglobin (Mb) and haemoglobin (Hb), i.e. NOMb and NOHb, are differentiated from OMb and OHb by conversion of the latter to reduced haemochromes by dithionite + nicotinamide. MetHb and MetMb may be differentiated by conversion to the carboxy derivatives by dithionite + CO. Applications of the method to study the nature of discoloration in cooked chicken products, and formation of nitrosyl pigments during cooking of cured pork, are described. DIH

## 105

**In vivo study on the storage of fenitrothion in chicken tissues after long-term exposure to small doses.**

Trottier, B. L.; Jankowska, I.

*Bulletin of Environmental Contamination and Toxicology* 24 (4) 606–610 (1980) [8 ref. En] [Dep. de Chimie, Univ. de Moncton, Moncton, New Brunswick, Canada E1A 3E9]

To determine whether long-term exposure to small doses of fenitrothion could lead to its storage, male Hubbert chickens were intubated with  $^3\text{H}$  ring-methyl fenitrothion into the stomach at 10 mg/kg body wt., twice every other wk for 2 to 8 wk. The chickens were divided into 4 lots; 3 lots (0.5, 1 and 2 month treatment) were sacrificed by decapitation 8 days and the 4th lot (2 month treatment) 16 days after the last intubation, resp. Results show that 8 days after the last intubation, measurable amounts of radioactivity were found in all tissues examined, except the brain. There is no evidence of bioaccumulation of radioactivity in the tissues during repeated administration of small doses. There was a sharp decrease in the radioactivity content of all tissues upon allowing 1 more wk for recovery. The findings suggest that chicken tissues retain no significant amount of fenitrothion or its metabolites even after a long-term exposure to small doses of the insecticide. VJG

## 106

**[Actin, target protein for estimation of muscle meat content in meat products.]**

Hartog, J. M. P. den

*Tijdschrift voor Diergeneeskunde* 105 (22) 967–974 (1980) [31 ref. NL, en] [Fac. der Diergeneeskunde, Biltstraat 172, 3572 BP Utrecht, Netherlands]

In an attempt to develop a direct method for detn. of the muscle meat content in meat products, the meat proteins of various animals (beef, pork, chicken, horse) were studied by sodium dodecyl sulphate polyacrylamide gel electrophoresis. The stability to 30 min heating at 50°–120°C was also studied. The electropherograms of the extracts from the various sp. were very similar. The various myofibrillar proteins (actin, d-actinin, myosin, myoglobin) were clearly visible in every case. Actin was resistant to >90°C heating (>110°C in beef), suggesting that it might be a useful parameter for estimating muscle meat. RM

## 107

**Early protein restriction of the broiler chicken and carcass quality upon later marketing.**

Moran, E. T., Jr.

*Poultry Science* 59 (2) 378–382 (1980) [10 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada NIG 2W1]

Commercial-source day-old chicks were reared (sexes separate) in floor pens and fed corn/soybean meal rations (3100 kcal metabolizable energy/kg) during the first 2 wk, that contained crude protein levels at, above, and below the estimated requirement (24, 26 and 22%, resp.). Common feeds, respective of sex, were offered through the subsequent 2 to 5 wk of age and finishing period. Apparent carcass yield and grades for conformation, fleshing, and finish were not influenced by marginal dietary protein changes during the starting period, regardless of sex and age at which the broilers were marketed. AS

## 108

**Prediction of fat and fat free live weight in broiler chickens using backskin fat, abdominal fat, and live body weight.**

Becker, W. A.; Spencer, J. V.; Mirosh, L. W.; Verstrate, J. A.

*Poultry Science* 58 (4) 835-842 (1979) [20 ref. En] [Dep. of Anim. Sci., Washington State Univ., Pullman, Washington 99164, USA]

Data from 100 male and 100 female broiler chickens raised on the floor under 2 lighting regimes (12 and 24 h light) were combined. Birds were weighed when 58 days old (male data presented first) (2372 g, 1913 g) and then slaughtered at 59 days. Abdominal fat was weighed (2.18%, 2.82%) and fat extracted from ground carcass (12.0%, 13.7%, wet basis), intestines (47.6%, 56.2%, dry basis), and from a triangular section of backskin (86.1%, 88.0% dry basis). % total fat was 10.4 and 12.2 (wet basis). Abdominal fat regressed on live body wt. produced negative intercepts, indicating that regressed rather than % values should be used. Fat from the 4 locations mentioned above had correlation coeff. of 0.45 to 0.76 for males and 0.47 to 0.74 for females. % abdominal fat had low nonsignificant correlations with fat free live body wt. ( $r = 0.23$  male, 0.07 female). Abdominal fat wt. was a better (higher  $r^2$ ) predictor of total fat, total fat minus abdominal fat, % carcass fat, and % intestinal fat, than % backskin fat. 33% (male) and 22% (female) of the variation of % abdominal fat was accounted for by % backskin fat. Abdominal fat should be obtained directly and used for predicting fat in the bird rather than backskin fat. Abdominal fat was 20.7% (male) and 22.8% (female) of total fat. Prediction equations for estimating total fat and fat free live wt., given abdominal fat, and live body wt. were developed. Selection against % abdominal fat would probably result in a reduction of fat in other locations and little change in fat free live wt. AS

## 109

**Drug resistant strains of bacteria isolated from domestic animals in Okinawa. IV. Drug resistance and R factors of *E. coli* isolated from broiler chicken and pork.**

Kinjo, T.; Shimabukuro, Y.; Tamaki, M.

*Science Bulletin of the College of Agriculture, University of the Ryukyus* No. 24, 475-486 (1977)

[14 ref. En, ja]

Studies were conducted on the incidence, strains and drug resistance characteristics of *Escherichia coli* isolated from 10 packaged broilers and 70 samples of pork from retail sources. *E. coli* was isolated from 54 out of 80 broiler tissue samples examined (8 samples/bird). All skin samples were positive for *E. coli*. 169 strains were isolated from the broilers; 156 strains were isolated from the 70 pork samples. Resistance of the isolates to (i) aminobenzyl penicillin, (ii) streptomycin, (iii) oxytetracycline, (iv) chloramphenicol, (v) kanamycin, and (vi) sulphadimethoxine was evaluated. Tables of results are given. Of the isolates from broilers, 153 (90.5%) were resistant to at least 1 of the drugs studied. 72.8% were resistant to (iii), 59.2% to (vi), 47.9% to (ii), 23.7% to (v) and 10.7% each to (i) and (iv). 16 isolates (9.5%) were

sensitive to all 6 of these drugs. Of the isolates from pork, 75 (48.1%) were resistant to at least 1 drug. Resistance to (ii) and (iii) was common among these isolates (39.1% for each). Few isolates from pork were resistant to (i) or (iv). 68.6% isolates from broilers showed multiple resistance, vs. 43.0% for isolates from pork. The relative frequencies of various multiple resistance patterns are discussed. 24.8% of resistant strains from broilers carried R factors, vs. 21.3% of resistant strains from pork. Implications of these results for food hygiene are discussed in detail. [See *Science Bulletin of the College of Agriculture, University of the Ryukyus* (1979) 22, 331-342 for part III.] AJDW

## 110

**[Comparative study on cold-stored eviscerated and non-eviscerated chickens.]**

Albuquerque, A. J. D. de; Santos, A. F. dos; Schneider, I.; Estefanel, V.

*Revista do Centro de Ciencias Rurais* 9 (1) 15-18

(1979) [5 ref. Pt, en] [Dep. de Microbiol. & Parasitologia, Univ. Fed. de Santa Maria, Santa Maria, Brazil]

Chickens, either (i) eviscerated or (ii) non-eviscerated, were held at 0°C for 0-96 h. At 24-h intervals, muscle samples were collected aseptically, homogenized in physiological saline, and the pH and total count of the homogenate were determined. A table of results is given. No significant difference was observed between results for (i) and for (ii) at any time during storage. Muscle homogenate pH tended to be higher for stored than for freshly slaughtered samples. Total counts of muscle homogenates were variable, and showed no clear relation to duration of storage. AJDW

## 111

**Microbiological quality of refrigerated chicken gizzards from different sources as related to their shelf-lives.**

Charoenpong, C.; Chen, T. C.

*Poultry Science* 58 (4) 824-829 (1979) [17 ref. En] [Mississippi State Univ., Mississippi 39762, USA]

Chicken gizzards were purchased from 3 retail stores and 1 processing plant. Studies were conducted to compare swab and rinse methods for microbial analysis of gizzards. The total, mould and yeast, coliform MPN, *Staphylococcus* (110 medium) counts, and shelf-life of gizzards from each store were enumerated and compared. The possible extension of shelf-life of raw gizzards by freezing during distribution was investigated. Ready-to-cook gizzards had an average wt. of 26.39 g, s.d. 6.14 g. Variation in gizzard size had no significant effect ( $P < 0.05$ ) on microbial counts by the rinse method. Mean log total counts of gizzard varied greatly among the 3 stores; they were 3.55, 4.36 and 5.01/g. Mean log coliform MPN were 1.63, 1.59 and 1.89/g, and mean log *Staphylococcus* counts were 2.15, 2.20 and 2.51/g, resp. Similar spoilage patterns were observed for the prefrozen and non-frozen gizzards. The shelf-lives of gizzards from the 3 retail stores ranged from 2.41 to 3.92 days. Higher initial counts resulted in shorter shelf-life. Freezing of the products during transport extended their shelf-lives in retail stores by approx. 4 days. AS

## 112

**Special report: influence of polyphosphate injection on the quality of processed broiler chickens.** [Book]  
 Jones, J. M.; Grey, T. C.; Griffiths, N. M.; Mead, G. C.  
*Report, ARC Food Research Institute Biennial Report 1977 & 1978*, 64-67; ISBN No. 0-7084-0160-0 (1980)  
 [8 ref. En] Norwich, UK; ARC Food Research Institute  
 Price £3.96

A 5% solution of the commercial polyphosphate preparation, Puron 6040, was injected into the breast of each carcass after removal of the viscera, but prior to washing and chilling. Results showed that the variation in % absorption of water was a function of the bird wt. immediately after evisceration rather than the wt. of polyphosphate solution injected. Total wt. gained by chilled carcasses that had been injected was always some 5% higher than with non-injected controls. On thawing, non-injected carcasses lost fluid approx. equal to that absorbed during spray-washing and immersion chilling. Injected carcasses lost only 50% of the total wt. gained during injection, washing and chilling. Wt. loss during the cooking of injected birds was greater than with non-injected. The overall effect of injection was to give a higher yield of cooked bird for a given eviscerated wt. Using a marker strain of *Clostridium perfringens* it was found that injection resulted in contamination of deep muscle and cross-contamination between carcasses. The injection did not affect the shelf-life of chill-stored carcasses. Assessments of texture, flavour and juiciness showed the injected chickens to be more tender and juicy than the non-injected birds. The influence of injection on flavour was very slight. Consumer surveys in the Norwich area suggest that there is a demand for 2 types of chicken meat, one very tender and juicy, and the other dried and more structured. VJG

## 113

[Concentration of n-paraffins in vaccinated and non-vaccinated broilers.]

Renon, P.; Cantoni, C.; Montagna, M.; Cammarata, M.; Parodi, M.; Luini, M.

*Archivio Veterinario Italiano* 31 (3/4) 111-127 (1980)  
 [46 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli Studi di Milano, Milan, Italy]

Persistence and distribution of hydrocarbons in edible tissues of broilers injected with Newcastle disease vaccine containing hydrocarbon preparations (Drakol Gur or Markol 52) as inert carriers was studied. Some chickens received 0.5 ml vaccine (containing 10% hydrocarbons); others received no injection. Muscle, skin, liver and kidney tissue samples were collected at intervals up to 97 days after treatment, and analysed for hydrocarbons by GLC. Tables of results are given. The results show no significant effect of injection with vaccines containing hydrocarbon carriers on hydrocarbon concn. in the edible tissues. Considerable variations in the hydrocarbon content and relative proportions of individual hydrocarbons were observed in tissues of both vaccinated and non-vaccinated birds during the experiment. AJDW

**Utilization of agro-industrial byproducts by livestock and poultry. II. Effect of higher levels of pea waste on the performance of broiler chicks.**

Paliwal, V. K.; Khirwar, S. S.; Pradhan, K.

*Haryana Agricultural University Journal of Research* 10 (2) 283-288 (1980) [5 ref. En] [Dep. of Anim. Nutr., Haryana Agric. Univ., Hissar, India]

Diets of 0, 10, 15 and 20% dried pea waste (PW) were fed to 96 day-old chicks for 10 wk (during which time individual body wt. and group feed consumption data were recorded) and carcass characteristics determined. Yields of dressed and eviscerated carcasses increased with % PW fed, from  $673.00 \pm 30.21$  to  $910.68 \pm 33.64$  g and from  $547.50 \pm 26.36$  to  $770.90 \pm 32.26$  g, at 0 and 20% PW in the diet, resp. Dressed % did not differ significantly between treatments, being  $70.49 \pm 0.38$  to  $71.8 \pm 0.36$ ; thus levels of PW did not alter proportions of edible meat in the carcass. LH

## 114

**Effect on broiler carcasses and water of treating chiller water with chlorine or chlorine dioxide.**

Lillard, H. S.

*Poultry Science* 59 (8) 1761-1766 (1980) [23 ref. En]  
 [Richard B. Russell Agric. Res. Cent., USDA, Sci. & Education Administration, PO Box 5677, Athens, Georgia 30604, USA]

Chiller water in a commercial broiler processing plant was treated with 20 or 34 p.p.m. Cl<sub>2</sub>, or 5 or 3 p.p.m. ClO<sub>2</sub>. Microbiologically, water samples were significantly better when 34 p.p.m. Cl<sub>2</sub> or 5 p.p.m. ClO<sub>2</sub> rather than 20 p.p.m. Cl<sub>2</sub> or 3 p.p.m. ClO<sub>2</sub> was used. Despite differences in chill-water quality, all treatments significantly reduced bacterial counts of carcasses over those of carcasses chilled in untreated water, although there was no significant difference in carcass counts among different treatment groups. AS

## 115

**To study the effect of inclusion of tranquilizer in ration on growth and carcass quality of meat type broilers.**

Varshney, V. K.; Agarwala, O. P.

*Allahabad Farmer* 50 (4) 383 (1979) [En]

This is an abstr. of an Allahabad University MSc Thesis by the 1st author. Effects of feeding diets containing 0, 0.5 or 0.75 mg reserpine/kg feed were studied using groups of 45 day-old chicks fed for 10 wk. Wt. gain, conversion efficiency and carcass quality were studied; dressing % for the 3 groups was 69.72, 70.74 and 70.77, resp. Optimum level for max. growth was 0.5 mg/kg feed. DIH

## 116

**Toxicity trials with a coccidiostat comprising sulphquinoline and diaveridine, and determination of residues in chickens treated with this coccidiostat.**

Gennaro-Soffietti, M.; Tappero, P.

*Annali della Facolta di Medicina Veterinaria di*

**Torino** 25, 230-235 (1978) [6 ref. It, en, fr] [Istituto di Patologia Generale & Anatomica Patologica, Univ. degli Studi di Torino, Turin, Italy]

14 Hubbard chickens, 30 days of age at the start of the trial, were treated for 5 consecutive days with a daily dose of 0.075 g sulphaquinoxaline + 0.060 g diaveridine/kg live wt. Pairs of treated birds were slaughtered 1, 2, 3, 5, 7, 9 and 11 days after cessation of administration of the coccidiostat mixture; muscle, liver and kidney tissue samples were analysed for residues by TLC. The results show that sulphaquinoxaline is detectable in liver and kidney 11 days and in muscle 9 days after cessation of treatment. Residues of diaveridine were detectable in muscle 5 days, in liver 7 days and in kidneys 9 days after cessation of treatment. AJDW

## 117

### Factors affecting fat deposition in broilers.

Cantor, A. H.

**Poultry International** 19 (1) 38, 40, 42, 96, 101 (1980) [En, de, fr, es, it, ja, ar] [Ohio State Univ., 190 North Oval Drive, Columbus, Ohio 43210, USA]

Problems with excessive fat deposition in broilers are discussed, with reference to consumer objections to excessively fat or 'oily' broilers, and decreased yields due to fat lost during processing. Factors influencing fat deposition in broilers are considered, including genetic factors, growth rate, sex, dietary energy level and dietary fat type. The degree of unsaturation of the dietary fat also influences the 'oily fat' defect. AJDW

## 118

### Unabsorbed egg yolks in broilers.

Leeson, S.; Walker, J. P.; Summers, J. D.

**Poultry International** 19 (1) 26, 30, 32, 95, 102 (1980) [En, de, fr, es, it, ja, ar] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Ontario, Canada]

Problems with large unabsorbed egg yolks in broilers are discussed, with special reference to contamination of the carcass when the unabsorbed yolk is ruptured during evisceration. This contamination may require trimming of the leaf fat, or condemnation of the entire carcass. Studies on factors influencing the incidence of unabsorbed yolks showed that males tended to have a higher incidence than females; that environmental temp. had little effect, although fluctuating temp. may increase incidence; and that holding the chicks overnight without feed considerably reduced incidence of unabsorbed yolks. A study was conducted on incidence of unabsorbed yolks and problems resulting therefrom in 4 broiler flocks, each comprising 5000-10 000 birds. Incidence of unabsorbed yolks ranged from 16 to 28%; total % of carcasses with a yolk problem ranged from 0.08 to 1.36% (0.03-0.36% being condemned, 0.05-0.80% requiring leaf fat removed). AJDW

## 119

Malonaldehyde concentrations in food are affected by cooking conditions.

Newburg, D. S.; Concon, J. M.

**Journal of Food Science** 45 (6) 1681-1683, 1687 (1980) [17 ref. En] [Dep. of Nutr. & Food Sci., Univ. of Kentucky, Lexington, Kentucky 40506, USA]

The relationship between cooking methods and production of malonaldehyde (MA), a putative carcinogen in mice was studied. In hamburgers pan-fried at moderate temp., the MA content increased 41-55%; frying at higher temp. (shorter cooking times) produced smaller increases. Microwave cooking increased MA concn. by only 15%. In contrast, cooking chicken by microwave, conventional oven, deep-fat-frying, and boiling increased MA concn. by 60-, 55-, 17-19-, and 22-fold resp.; the broth contained half the MA produced in boiled chicken. On an equal portion basis, fried chicken contained less MA than hamburger. Appreciable amounts of MA were also found in smoked trout (2.2-3.8 µg/g), canned chicken broth (2.3 µg/g), bouillon cubes (5.3 µg/g) and cheese (0.44-0.74 µg/g), depending on cooking conditions. IFT

## 120

### Detection of mitogenic activity of staphylococcal enterotoxin A in foods.

Stelma, G. N., Jr.; Archer, D. L.

**JRCS Medical Science** 8 (6) 347 (1980) [5 ref. En] [Div. of Microbiol., FDA, Cincinnati, Ohio 45226, USA]

A highly sensitive biological assay has been developed with antigenic specificity based on neutralization of mitogenic potential. *Staphylococcus aureus* 100 (producer strain for staphylococcal enterotoxin A) and *Staph. aureus* 184 (a non-enterotoxigenic strain) were grown in baby food (chicken in chicken broth) and in sterile reconstituted dried skim-milk at 37°C. Removal of inhibitory factors from food extracts by dialysis permitted the detection of 10-fold lower amounts of staphylococcal enterotoxin A (SEA). In each food and in the culture medium, min. detectable SEA was produced by approx.  $10^4$  to  $5 \times 10^4$  colony forming units (CFU)/ml. All the mitogenic activity produced in the food samples was neutralized by antibody to SEA. Samples of both foods in which *Staph. aureus* 184 was allowed to grow to densities greater than  $10^8$  EFU/ml contained no detectable mitogenic activity. The ability of antiserum prepared against purified SEA to neutralize all of the mitogenic activity detected in the food extracts and the failure of the non-enterotoxigenic *Staph. aureus* 184 to produce mitogenic activity in the foods are evidence that this test is specific for SEA. VJG

## 121

### *Salmonella agona* isolated from fishmeal and a *Salmonella* strain isolated from shrimps in Lebanon.

Roumani, B. M.; Abdelnoor, A. M.; Hilan, C.

**Zentralblatt für Bakteriologie, 1B** 172 (4/5) 411-414 (1981) [7 ref. En, de] [Dep. of Microbiol., American Univ. of Beirut, Beirut, Lebanon]

10 samples of (i) imported fish meal, 12 samples of (ii) locally produced chicken and 150 samples of (iii) locally produced fish, sea urchins and shrimps were examined

for *Salmonella agona*. A strain from the Bulgarian Type Culture Collection was used as a standard. A table of data is given for biochemical reactions and test results for the standard strain and for isolates from (i), (ii) and shrimps. The (i) strain closely resembled the standard strain, and is concluded to be *Salm. agona*. The characteristics of the (ii) strain are typical of *Salm. paratyphi A*. The shrimp isolate is believed to be a new *Salmonella* strain as it contains a Vi antigen, while serologically and biochemically it is neither *Salm. typhi* nor *Salm. paratyphi C*. AJDW

of meat from mechanically deboned chickens were similarly examined, then inoculated with *salmonellae* (50 g); 1 sample was frozen at once, the other treated with potassium sorbate (1 g/kg meat) before freezing. Results (tabulated) showed that bacterial contamination, especially by psychrotrophs, was substantially reduced by potassium sorbate treatment. *Salmonella* contamination was reduced by 50–60%. When samples from all immersed or sprayed carcasses were examined for potassium sorbate residues after washing in running water, virtually all traces had been removed. KME

## 122

**Evidence of a glucose-insulin imbalance and effect of dietary protein and energy level in chickens selected for high abdominal fat content.**

Touchburn, S.; Simon, J.; Leclercq, B.

*Journal of Nutrition* 111 (2) 325–335 (1981) [20 ref. En] [Sta. de Recherches Avicoles, INRA, 37380, Nouzilly, France]

Various dietary protein and energy levels were used on chicks of high (fat line, FL) or low (lean line, LL) abdominal fat content, but similar body wt., at 14–57 days of age. Abdominal fat was  $21.2 \pm 0.9$ ,  $13.8 \pm 0.8$  and  $11.0 \pm 0.7$  g in FL birds at 5 wk, having been fed 16, 20 or 24% protein diets, all with 3100 kcal/kg energy value; LL birds had corresponding values of  $11.8 \pm 0.9$ ,  $8.0 \pm 1.0$  and  $5.8 \pm 0.6$ . LH

## 123

**[Important characteristics of modern breeds of chickens. II. Meat type breeds.]**

Singh, B. P.; Sharma, R. P.; Keshari, R. C.

*Poultry Guide* 17 (1) 63–64 (1980) [En] [Cent. Avian Res. Inst., Izatnagar, Uttar Pradesh, India]

Breeds considered include Cornish, White Plymouth Rock, New Hampshire, dwarf meat strains, and specialized meat strains. [See FSTA (1981) 137Q101 for part I.] CFTRI

## 124

**[Potassium sorbate and shelf-life of poultry.]**

D'Aubert, S.; Politi, P. G.; Simonetti, P.

*Industrie Alimentari* 19 (10) 759–762 (1980) [13 ref. It. en] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli Studi, Milan, Italy]

With a view to increasing the shelf-life of prepared poultry, a series of experiments was carried out using potassium sorbate to inhibit growth of bacteria, especially *salmonellae* and *Pseudomonas putrefaciens*. Strips of skin from 30 chilled (below 4°C) chickens, viz. 10 control, 10 sprayed with 3 ml of 10% solution of potassium sorbate each, and 10 immersed in 10% solution of potassium sorbate for 1 min, were analysed by standard methods for total bacterial count, coliforms, *salmonellae*, and psychrotrophs. The chickens were then refrigerated at 1°C and reanalysed after 8–12 and 14 days. In a 2nd experiment an untreated batch of 20 chicken necks (control) was compared with a similar batch immersed in 10% potassium sorbate solution (pH 8.35) for 30 s immediately after preparation. 2 samples

## 125

**Effect of carbon dioxide snow on shelf life of packaged chicken.**

Reddy, K. V.; Kraft, A. A.

*Journal of Food Science* 45 (5) 1436–1437 (1980) [11 ref. En] [Dep. of Food Tech., Iowa State Univ., Ames, Iowa 50011, USA]

This study had the purpose of determining effective concn. of CO<sub>2</sub> snow as a preservative for poultry meat under different external temp. conditions. Survival and growth of microorganisms on the surface of chicken was determined after 48 h in plastics foam boxes containing different levels of CO<sub>2</sub> and after storage in a retail display case at about 5°C. Different ratios by vol. of CO<sub>2</sub> snow to chicken were used and detn. were made of CO<sub>2</sub> in containers and absorbed by the chicken meat. In general, CO<sub>2</sub> snow resulted in greater decreases in counts of fluorescent *Pseudomonas* than total psychrotrophs and had little effect on mesophilic bacteria. With ratios of CO<sub>2</sub> to chicken of 1.5:1.0, some inhibition of bacterial growth was observed, but the effect varied with different types of bacteria. Greater benefit was obtained when external temp. was 10°C than when it was 21°C. A min. concn. of 40% CO<sub>2</sub> was needed in the container atm. when external environmental temp. exceeded 21°C. IFT

## 126

**A comparison of consumer methods of storing chicken broilers at home.**

Gardner, F. A.; Hopkins, W.; Denton, J. H.

*Poultry Science* 59 (4) 743–747 (1980) [16 ref. En] [Poultry Sci. Dep., Texas Agric. Exp. Sta., College Station, Texas 77843, USA]

32 broiler carcasses were purchased from a retail source and were then placed at 4°C for short term storage under household storage conditions. Carcasses were evaluated for bacterial growth initially and after 1, 5, and 8 days of storage. Measurements included enumeration of psychrotrophic and mesophilic bacteria, coliforms and fungi on the breast surface of the broiler carcasses. Results indicate that there was little benefit derived from opening the retail package prior to storage. Removing carcasses from the retail package and repacking them resulted in a small increase in bacterial count which was probably due to the handling associated with repackaging. There was no improvement in product shelf-life associated with the repackaging process. However, washing the carcasses in cold tap water prior to repackaging and subsequent storage resulted in a decrease in initial bacterial count and a subsequent increase in product shelf-life. AS

## 127

[Abstracts of papers presented at the 3rd annual meeting of the Chilean Society for Animal Production.]

**Chile, Sociedad Chilena de Producción Animal**  
**Archivos de Medicina Veterinaria** 10 (2) 188-206  
 (1978) [Es]

Abstracts are given of papers presented at this meeting, held at the Universidad Austral de Chile, Valdivia, including the following. Effects of hybrid vigour and sex on growth and carcass quality in Hampshire Down x Romney Marsh lambs, by S. Kusanovic M. & M. Herve A. (p. 191). Beef production in dual purpose steers with various feeding systems and an anabolic agent, by E. Silva, E. Haardt & R. Schmidt (p. 193). Effects of 3 anabolic agents on meat production of steers grazing range pasture, by E. Silva, K. Rusch & J. Lalanne (p. 193). Effect of cooling, time and air temperature on the bacteriological quality of milk evaluated by the methylene blue reduction test, by C. Pedraza, J. J. Romero & M. Andrade (pp. 194-195). Replacement of maize by rye in rations for growing/finishing swine, by A. Skoknic K., I. Diaz C. & G. Bustamante S. (pp. 197-198). Rose hip by-products in feeding of swine, by J. G. R. Wilke (pp. 198-199). The energy content of body protein and fat in cattle, by R. Anrique, J. T. Reid, S. Simperdorfer & H. Ayala (p. 203). Effects of dietary fat source on keeping quality of frozen broilers, by J. A. de la Vega, F. Garcia & D. Zanarta (pp. 205-206). AJDW

## 128

[Relationship between biological value of proteins and their quality.]

Krajcovicova, M.; Dibak, O.; Bucko, A.

**Prumysl Potravin** 30 (6) 356-357, 359, 351 (1979)

[21 ref. Cs] [Vyskumny Ustav Vyzivy L'udu, Bratislava, Czechoslovakia]

6 samples each of mutton, beef and chicken leg meat, wheat gluten and kidney bean were tested on rats for nutritive values of proteins, at the 10% level of protein intake, and analysed for contents of component amino acids by GLC. Mean values with s.e. mean tabulated for 16 amino acids include the following essential/non-essential amino acid ratios in the 5 products, resp.: 0.747, 0.707, 0.669, 0.290 and 0.676. Respective values with s.e. mean from the rat tests were: protein efficiency ratio,  $3.30 \pm 0.22$ ,  $2.97 \pm 0.08$ ,  $2.74 \pm 0.21$ ,  $0.76 \pm 0.04$  and  $-1.05 \pm 0.19$ ; net protein ratio  $4.20 \pm 0.19$ ,  $3.81 \pm 0.14$ ,  $3.69 \pm 0.23$ ,  $1.44 \pm 0.06$ , and  $0.73 \pm 0.01$ ; net protein utilization,  $108.6 \pm 10.4$ ,  $95.4 \pm 6.8$ ,  $96.4 \pm 5.3$ ,  $27.5 \pm 1.3$ , and  $6.41 \pm 0.81$ ; and liver protein utilization [Mokady et al. *British Journal of Nutrition* (1969) 23 (3) 491],  $7.24 \pm 0.62$ ,  $6.08 \pm 0.71$ ,  $6.32 \pm 0.85$ ,  $0.79 \pm 0.05$ , and  $-1.42 \pm 0.26$ . The agreement between the ratios of essential/non-essential amino acids and the nutritive values is pointed out, the exception concerning the kidney bean being ascribed to its content of trypsin inhibitors. SKK

## 129

[Trends in the meat quality of broilers.] Zur Entwicklung der Fleischqualität von Broilern. Ristic, M.

**Fleischerei** 31 (10) 1070-1072 (1980) [22 ref. De]

[Bundesanstalt für Fleischforschung, D-8650 Kulmbach, Federal Republic of Germany]

Trends in production and consumption of broiler meat, the growth and feed efficiency of broilers, and carcass and meat quality characteristics (carcass wt., pH, tenderness, cooking loss, loosely-bound water content, colour, organoleptic properties, and yields of carcasses prepared in various ways) are discussed on the basis of literature data for the period 1968-1979. Effects of age and sex on carcass and meat quality characteristics are also considered. AJDW

## 130

Mineral content and proximate analysis of broiler meat from two strains and three regions of production.

Hamm, D.; Searey, G. K.; Klose, A. A.

**Journal of Food Science** 45 (6) 1478-1480 (1980) [9 ref. En] [Richard B. Russell, Agric. Res. Cent., SEA-AR, PO Box 5677, Athens, Georgia 30613, USA]

Contents of moisture, fat, protein, and 8 minerals in commercial broiler breast and thigh meat were defined by analysing 15-bird lots in a factorial design of 2 sexes  $\times$  2 commercial strains  $\times$  3 widely separated regions of production. Small but statistically significant differences due to strain, sex and region were found for many of the variables examined. Region significantly influenced all the element levels except P in both breast and thigh flesh. Ca levels found were about half those previously reported. The differences are probably not nutritionally important under normal consumption patterns. IFT

## 131

Sensory profiling of canned boned chicken: comparisons of retail, school lunch, and military canned boned chicken.

Lyon, B. G.; Klose, A. A.

**Journal of Food Science** 45 (5) 1336-1340 (1980) [7 ref. En] [USDA, SEA, Anim. Products Composition & Utilization Res. Unit, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

Lack of domestic retail markets and poor quality and acceptance have hampered optimum use of spent fowl (old laying hens) as a highly nutritious, inexpensive, and convenient food. Major outlets for canned boned chicken have been developed through USDA and military food programmes. The purpose of this study was to compare canned boned chicken products (USDA, military, and retail) using quantitative descriptive analysis techniques. In general, USDA school lunch products were characterized as having more ground and shredded meat constituents than the retail or military products. School lunch products were also less tender and cohesive, quicker to break down on mastication, less juicy, more off-flavoured, and less desirable than the retail and military products. Through factor analysis and calculations of factor scores, the

original set of 12 numbers to characterize a product was reduced to 4 numbers that revealed the extent to which products exhibited attributes represented by the factors. All USDA and military products met their min. specifications for proximate composition and yield. However, USDA school lunch products varied in ranges of moisture, fat, protein, and drained wt. IFT

## 132

**Sensory profiling of canned boned chicken: sensory evaluation procedures and data analysis.**

Lyon, B. G.

*Journal of Food Science* 45 (5) 1341-1346 (1980)  
[16 ref. En][USDA, SEA, Anim. Products Composition & Utilization Res. Unit., Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

Quantitative descriptive analysis techniques were explored to develop procedures to identify primary defects in product quality of canned boned chicken from spent fowl. An extensively trained panel identified 12 sensory attributes important to the discrimination of differences among various sources of canned chicken. Through factor analysis the 12 sensory attributes were distributed into 4 general categories: texture, juiciness, off-flavour, and appearance. Elimination from factor analysis of those attributes which showed little or no contribution to product differentiation increased the cumulative variance accounted for in the data from 68.8% (with all attributes) to 77.4% (with 3 attributes omitted) and factors which represented texture, juiciness, and off-flavour showed increases in the portion of variance explained. The appearance factor showed a slight decrease. Texture attributes made the greatest contribution to product differentiation by the trained panel as determined by factor analysis. Further work with large consumer panels would be needed to estimate the contribution that individual attributes make to the perceived desirability of the products. IFT

## 133

**Available lysine - I. Factors affecting availability. [Review]**

Anderson, T. R.; Quicke, G. V.

*South African Food Review* 7 (5) 47, 49, 51, 53-54, 103, 105, 107-108, 124 (1980) [99 ref. En][Dep. of Biochem., Univ. of Zululand, Natal, South Africa]

This paper reviews information on factors affecting availability of lysine in food (viz. protein-protein, protein-carbohydrate, protein-lipid, protein-nucleic acid, protein-formaldehyde and protein-alkali interactions). The relationship of these reactions in food is considered using examples, including loss of lysine in spray dried milk, or in chicken heated at 121°C in the presence of natural fat. Indiscriminate use of heating and certain additives (sodium bisulphite, formaldehyde and alkali) should be discouraged, and a compromise reached between the necessity of food processing and the problem of protein quality retention. LH

## 134

**Influence of freezing and thawing on the release of cytochrome oxidase from chicken's liver and from beef and trout muscle.**

Barbagli, C.; Serlupi Crescenzi, G.

*Journal of Food Science* 46 (2) 491-493 (1981) [9 ref. En][Lab. degli Alimenti, Istituto Superiore di Sanita, V. le Regina Elena 299, 00161 Rome, Italy]

The process of freezing and thawing animal tissues causes a marked release of cytochrome oxidase from mitochondria. The activity of cytochrome oxidase in extracts of tissues after freezing and thawing increases by 15× in chicken liver, by 2.5× in trout, and by 4× in beef muscle, compared with extracts of unfrozen samples. These results suggest that the measurement of cytochrome oxidase activity can be used to develop a rapid and simple method which would allow distinguishing between unfrozen and frozen/thawed tissues. IFT

## 135

**An investigation of the genetic toxicology of irradiated foodstuffs using short-term test systems. II. Sister chromatid exchange and mutation assays in cultured Chinese hamster ovary cells.**

Phillips, B. J.; Kranz, E.; Elias, P. S.

*Food and Cosmetics Toxicology* 18 (5) 471-475 (1980)  
[8 ref. En][Int. Food Irradiation Project, Federal Res. Cent. for Nutr., Postfach 3640, D-7500 Karlsruhe, Federal Republic of Germany]

Cultured Chinese hamster ovary cells were exposed to extracts and digests of irradiated and unirradiated dates, fish and chicken. Results showed no genetic toxicity induced in the 3 foods by irradiation. The general applicability of cell culture tests to the detection of mutagens in food is discussed. [See FSTA (1981) 13 7C222 for part 1] VJG

## 136

**Irradiated foods - status at home and abroad.**

Anon.

*South African Food Review* 7 (5) 41, 43-44 (1980) [En]

Past developments and the present status of food irradiation are discussed in relation to its recent development as a method of food sterilization. Foods satisfactorily experimentally subjected to irradiation include potatoes, chicken, wheat and strawberries. Irradiation is very penetrating, and because it is a cold process does not adversely affect natural quality. It is at

present thought of as an additive process rather than a physical treatment. More information on costing of this process is needed before industrial use on a large scale is considered. LH

## 137

**[Interaction between meat protein and soybean protein - effect of heating on SDS polyacrylamide gel electrophoresis patterns.]**

Shiga, K.

*Journal of the Faculty of Applied Biological Science, Hiroshima University* 19 (2) 183-190 (1980) [15 ref. Ja. en][Fac. of Applied Biol. Sci., Hiroshima Univ., Fukuyama, Japan]

Studies were conducted on changes in electrophoretic patterns of chicken and soybean proteins as a result of heating to 70° or 100°C, either alone or together. Numerous electrophoretograms are illustrated. The water-soluble fraction from chicken muscle showed 7 distinct bands before heating, most of which disappeared on heating to 70°C. 9-10 bands were observed on electrophoretograms of the unheated NaCl-soluble fraction from chicken muscle; these decreased to 1 or 2 on heating to 100°C. 4 main bands and 2 slower-moving bands were observed for the water-soluble fraction of soy protein; the latter 2 decreased in intensity when heated at 70°C, and the fastest-moving band decreased markedly on heating at 100°C. Electrophoretic patterns of the NaCl-soluble fraction of soy protein were similar to those of the water-soluble fraction. Changes in electrophoretic patterns in chicken and soy proteins heated together did not differ significantly from those of the same proteins heated separately. [From En summ.] AJDW

## 138

### Control of fat deposition in hens.

Anon.

*Poultry International* 19 (9) 122-126, 133, 135 (1980)  
[En, fr, it, es, ja, ar, de]

Studies on effects of niacin supplements (20, 60 or 100 p.p.m.) on feed efficiency, wt. gain and fat accumulation characteristics of laying hens are briefly described. The results show that niacin supplements enhanced feed efficiency, reduced fat accumulation in the carcass and the liver, and tended to increase linoleic acid concn. in the liver. Effects of niacin supplements were greater for hens receiving high-energy diets than for those receiving low-energy diets. 60 p.p.m. niacin were required for consistent prevention of excessive fatness and the fatty liver syndrome. Little effect of dietary niacin supplements on laying performance was observed. AJDW

## 13.9

### Return of investment in stackable tanks.

McDonald, S.

*Poultry International* 19 (8) 92-94, 96, 98, 114, 116  
(1980) [En, de, fr, it, es, ja, ar]

Use of 500 kg capacity stackable stainless steel tanks for handling and transport of chicken carcasses at the Honey Bear Foods Inc. killing plant at Lola, Kansas and processing plant at Neosho, Missouri, is described. The tanks replaced heavy cardboard bins, which cost \$11 each and could be used only once; the stainless steel bins paid for themselves in 38 days. Other advantages of the tanks include easy transport, suitability for both inter-plant and within-plant transport, and easy and efficient cleaning. AJDW

## 140

### Cholesterol content of chicken skin.

Bovenkamp, P. van de; Katan, M. B.

*Journal of Food Science* 46 (1) 291 (1981) [3 ref. En]  
[Dep. of Human Nutr., Agric. Univ., De Dreijen 11,  
6703 BC Wageningen, Netherlands]

In order to resolve conflicting reports on the cholesterol concn. in chicken skin, cholesterol in skin was assayed by GLC. The mean content for 6 chickens was 71 mg/100 g raw skin (range, 58-95 mg). Thus, the suggestion that chicken skin is particularly high in cholesterol is probably not correct. IFT

## 141

### Sun Valley: getting fresher.

Pickstaff, -.

*Frozen Foods* 33 (3) 26, 28 (1980) [En]

Developments at Sun Valley, one of Britains largest producers of chicken and turkey meat, are described. Products include dry chilled frozen poultry (i.e. frozen without added water), frozen poultry portions, and cooked poultry, poultry portions and poultry products. AL

## 142

### Examination of vacuum-packed convenience foods for *Clostridium botulinum*.

Siddiqui, A. K.; Ando, Y.; Karashimada, T.

*Report of the Hokkaido Institute of Public Health [Hokkaidoritsu Eisei Kenkyusho Ho]* No. 29, 20-22 (1979) [4 ref. En] [Atomic Energy Cent., Ramna, Dacca, Bangladesh]

1-3 month old samples of vacuum-packaged foods, viz. 40 samples of meat sausages, 25 of fish sausages, 15 of hamburgers, 10 of luncheon steaks and 15 of kamaboko, and 15 samples of roast chicken 3 h post-preparation, were collected and analysed for *C. botulinum* contamination by growth and gas production in TPGY medium, and for toxicity by intraperitoneal injection into mice. Gas production was noted in some samples of all foods, but none was linked to botulinal toxicity. *Bacillus* spp., putrefactive anaerobes, cocci and other unidentified spp. were probably responsible for gas production. LH

## 143

### Effects of zinc, iron and copper supplementation in cassava-based diets for broiler chickens.

Phuah, C. H.; Hutagalung, R. I.

*Pertanika* 3 (2) 71-77 (1980) [14 ref. En, my] [Dep. of Anim. Sci., Univ. Pertanian Malaysia, Serdang, Selangor, Malaysia]

2 experiments involving 216 chicks were conducted to assess effects of supplemental levels of Zn (0, 25, 50 p.p.m.) in combination with Fe (0, 25, 50 p.p.m.) in Experiment 1 and with Cu (0, 5, 10 p.p.m.) in Experiment 2, in diets containing cassava (40%) and protein (20-17%). The dietary treatments were arranged in a 3 × 3 factorial experiment. Mineral supplementation in cassava-based diets had little overall effect on rate and efficiency of gain. Inclusion of increasing amounts of Zn in combination with Fe or Cu had inconsistent effects on fat and protein content of the carcass. Chicks fed cassava-based diets supplemented with Fe showed less carcass Zn levels, but had higher liver Zn content than those fed diets unsupplemented with Fe. Raising the Zn content of the diet resulted in reducing Cu retention in the liver, regardless of its combination with Fe and Cu. AS

**144**

**Non-bitter protein hydrolysates.**

Stanley, D. W.

**Canadian Institute of Food Science and Technology Journal** 14(1) 49-52 (1981) [12 ref. En, fr] [Dep. of Food Sci., Univ. of Guelph, Guelph, Ontario N1G 2W1, Canada]

Deboned, defatted chicken meat (78% protein, dry basis) was reacted with pancreatin to produce a bitter hydrolysate as judged by a trained sensory panel. Hydrolysis was carried out at 60°C, enzyme concn. 0.6M (KCl). These conditions resulted in > 95% substrate solubility after 120 min. Enzyme activity was monitored by formol titration. Samples for sensory analysis and  $\alpha$  amino N were taken after 0, 30, 60, 90 and 120 min and it was found that when chicken alone was reacted with enzyme a steady increase in bitterness was perceived by the panel up to 90 min, reaching a level equivalent in quinine concn. of > 0.003%. The  $\alpha$  amino N curve was similar in shape to that for bitterness, increasing from about 6 to 23 mg/g total protein. When gelatin was added (1:1 protein basis, enzyme level constant) the  $\alpha$  amino N curve was not substantially altered but no significant increase in bitterness was perceived. When glycine, which is a sweet amino acid found in large quantities in gelatin, was added to the chicken hydrolysate at the same level that would have been in a chicken:gelatin preparation, it significantly reduced bitterness while proline and hydroxyproline alone did not. It was concluded that the mechanism by which gelatin affects protein hydrolysates may be the ability of the endogenous amino acid glycine to mask bitterness.

AS

**145**

**New process spurs Banquet's food service thrust.**  
Hollingsworth, P., Jr.

**Processed Prepared Food** 149 (6) 54-57 (1980) [En]

Consideration is given to the manner in which Banquet Foods Corp., of St. Louis, Missouri, the leader in retail frozen fried chicken, is developing its food service business. The food service operation is centred round 'Flexible Fryer' which consists of specially processed, portion controlled, prepared chicken pieces that can be either baked or deep fried by the end-user with equally good results. VJG

**146**

**[Study on economic nutrient requirement of broiler chick by linear programming techniques.]**

Rhee, Y. C.; Ha, S. H.; Goh, Y. G.

**Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]** 22 (5) 340-352 (1980) [46 ref. Ko, en] [Coll. of Agric., Kangwon Nat. Univ., Kangwon, S. Korea]

Effect of feeding different levels of metabolizable energy and protein in variable diets, based on corn plus several other meals (wheat, soybean, sesame, perilla, rapeseed, fish and feather), on body composition, growth and economic performance of broiler chicks was studied. The chicks were fed diets A-E (varied between 0-3, 4-6 and 7-8 wk periods) whereby A had

highest crude protein and energy levels, values falling to a min. in E (dietary composition is given). Abdominal fat (% of body wt.) was 2.43, 2.21, 1.78, 1.46 and 1.52 in A-E, resp.; carcass protein (%), 22.2, 22.3, 22.1, 20.6 and 18.6; carcass fat (%), 9.6, 9.3, 8.2, 8.6 and 7.4; visceral protein (%), 12.3, 11.2, 13.1, 15.5 and 10.9; and visceral fat (%) 22.2, 17.2, 17.3, 17.3 and 20.1. High energy diets increased body fat and abdominal fat pad size. Gross income was not directly related to diet energy level. [From En summ.] LH

**147**

**Spoilage of chicken skin at 2°C: electron microscopic study.**

Thomas, C. J.; McMeekin, T. A.

**Applied and Environmental Microbiology** 41 (2) 492-503 (1981) [27 ref. En] [Dep. of Agric. Sci., Univ. of Tasmania, Hobart, Tasmania 7001, Australia]

Microscopic techniques were used in conjunction with normal microbiological procedures to examine the development of the spoilage microflora on the skin of chicken carcasses held at 2°C. Pigmented and nonpigmented psychrotrophic pseudomonads were the major spoilage bacteria isolated at all stages of storage examined. The spoilage microflora grew within a liquid film covering the skin surface, as well as in feather follicle shafts. Penetration and disruption of skin tissue were not observed even after onset of organoleptic spoilage. Bacteria were not attached to the skin by extracellular bridging substances. These data suggest a nonspecific histological-microbiological relationship between the spoilage association and the skin substrate. AS

**148**

**[National Food Administration Ordinance amending Ordinance VF 1958:18 on Inspection of Poultry Meat.]**

Sweden, Statens Livsmedelsverk

**Statens Livsmedelsverks Författningsamling SLV FS 1980:19**, 1p. (1980) [Sv]

Amendments to Ordinance VF 1958:18 are presented, including changes in requirements for condemnation of heads, feed and viscera of chickens, except for the edible giblets (heart, liver and gizzard), and also the kidneys, if National Food Administration requirements on sampling and inspection of chickens are observed. This Ordinance came into force on 1 Jan. 1981. AJDW

**149**

**[National Food Administration Ordinance on testing for residues of coccidiostats in tissues of chickens.]**

Sweden, Statens Livsmedelsverk

**Statens Livsmedelsverks Författningsamling SLV FS 1980:20**, 1p. (1980) [Sv]

Requirements concerning testing for coccidiostat residues in chickens in Sweden are discussed with reference to sampling, despatch of samples to the National Food Administration for testing, re-sampling and re-testing in cases where excessive coccidiostat levels are recorded, and responsibility of the slaughterhouse for payment of the costs of sampling and testing. This ordinance came into force on 1 Jan. 1981. AJDW

## 150

[Benzathine penicillin G residues in chicken muscle, liver and kidneys after addition to the feed.]  
Moreno, B.; Calles, A.

*Anales de Bromatología* 32 (1) 22-32 (1980) [many ref. Es, en] [Fac. de Vet., Leon, Spain]

Benzathine penicillin G residues were determined in the muscle, liver and kidneys of chickens fed this drug at concn. of 500, 100, 50 and 10 p.p.m. in the diet for 21 days. Samples taken 0, 12, 24, 48, 72, 96, 120 and 144 h after withdrawal of the antibiotic from the feed were analysed. Tabulated results showed that for complete disappearance of residues 144 h were required at the 500 p.p.m. level, 96 h at the 100 p.p.m. level (except for kidneys) and at the 50 p.p.m. level (except for liver), and 48 h for the 10 p.p.m. level (except for kidneys).

Quantitative detn. of the penicillin was based on Kramer's method (FDA, 1968) using *Sarcina lutea* ATCC 9341 (sensitivity 0.0025 IU/g tissue). Results are discussed in relation to potential health hazards (allergic reactions, resistance) of residues of antibiotics in foods. Withdrawal times of 3-6 days before slaughter are recommended (depending on the dose). RM

## 151

A note on the shelf-life and spoilage of commercially-processed chicken giblets.

Mead, G. C.; Adams, B. W.

*British Poultry Science* 21 (5) 411-415 (1980) [9 ref. En] [Agric. Res. Council Food Res. Inst., Colney Lane, Norwich NR4 7UA, UK]

When chicken gullet tissues wrapped individually in polyethylene film were stored at 1°C, off-odours were detected in 11 to 14 days with necks (mean 12.3 days) tending to spoil before gizzards, hearts and livers (means 13.0 to 13.7 days). In all cases, the predominant organisms at spoilage were *Pseudomonas* spp. with lower numbers of *Acinetobacter* spp. Chlorination of process water at about 50 mg total residual Cl<sub>2</sub>/l (including 0.1-0.9 mg free Cl<sub>2</sub>/l) extended the shelf-life of giblets held at 1°C by up to 3 days; prior freezing of these tissues gave an extension of 1-2 days but combining the 2 treatments did not have an additive effect. Immersing giblets for 1 min in a solution containing 100 g potassium sorbate/l (pH 8.0) doubled the shelf-life of each type of tissue by retarding growth of the normal spoilage microflora. AS

## 152

A comparison of methods for determining the fat content of broiler carcasses.

Verstrate, J. A.; Spencer, J. V.; Mirosh, L. W.; Becker, W. A.

*Poultry Science* 59 (2) 298-302 (1980) [14 ref. En] [Washington State Univ., Pullman, Washington 99164, USA]

A total of 300 broilers, 55-59 days of age, was used in comparative study on detn. of fat by (i) the rapid 'Banco' method [Anderson et al., *Journal of the Association of Official Analytical Chemists* (1962) 45, 13-16] and (ii) the standard Goldfisch ether extraction procedure. Moisture content of the carcasses was also determined.

Fat content of carcasses was consistently 1.5-1.7% lower when determined by (i) than by (ii); s.d. of triplicate analyses was, however, lower for (i) than for (ii). Fat contents determined by (i) and (ii) were highly correlated ( $r = 0.89-0.95$ ). Moisture content was highly correlated with fat determined by either (i) ( $r = -0.87$  to  $-0.90$ ) or (ii) ( $r = -0.87$  to  $-0.89$ ). Linear regression equations for predicting (ii) fat content from (i) fat content or moisture content are presented. Relative costs and analysis times of the methods are discussed; it is concluded that (i) is suitable for routine use. AJDW

## 153

Effect of arylation for setting of muscle proteins.

Niwa, E.; Nakayama, T.; Hamada, I.

*Agricultural and Biological Chemistry* 45 (2) 341-344 (1981) [12 ref. en] [Fac. of Fisheries, Mie Univ., Tsu 514, Japan]

Thermal behaviour of muscle proteins arylated with arylsulphonates and arylsulphonyl chlorides was investigated. ATP-sensitivity and superprecipitation of arylated actomyosin, water content of resulting gel and its instantaneous elastic modulus were also measured. Myosin and actomyosin from frozen pork (ham) and instantly killed hen (pectoral) muscles gelled readily at 40°C, and would even gel at 4°C (though the viscosity of the gel was lower than that of the modified gel at 40°C). Water content of gel did not seem to affect its elasticity; the elastic modulus of the gel increased with increasing amount of arylating reagent, this increase being suppressed by sucrose addition. These results are related to fish sol setting at low temp. LH

## 154

[Study of effect of noise on growth and slaughter value of chickens.]

Domanski, J.; Kluczek, J. P.; Narucka, I.

*Roczniki Akademii Rolniczej w Poznaniu* No. 94 (Zootechnika 23) 55-60 (1977) [6 ref. Pl, en, ru] [Inst. Hodowl i Tech. Produkcji Zwierzej, AR, Poznan, Poland]

Experimental groups of Leghorn and New Hampshire (New H) chickens were subjected to a 85-90 db 1000 Hz noise in 1 of 3 treatments according to age: (i) from 0 to 4 wk, slaughtered at 4 wk; (ii) from 0 to 8 wk, slaughtered at 8 wk; or (iii) from 16 to 20 wk, slaughtered at 20 wk. Corresponding control groups were slaughtered at 4, 8 and 20 wk. Tabulated data show, for each group and breed, live wt. at slaughter, hot and chilled carcass yield, wt. of meat, skin, bones and giblets in carcass, and meat:bone ratio in carcass. All noise treatments significantly lowered hot carcass yields for New H; (i) also lowered chilled carcass yield. The only significant effect of noise on carcass yield of Leghorn was a lowering of hot yield in (i). Carcass composition was not significantly affected. [From En summ. and tables.] DIH

## 155

Cheddar cheese made with chicken pepsin.  
Stanley, D. W.; Emmons, D. B.; Modler, H. W.;  
Irvine, D. M.

*Canadian Institute of Food Science and Technology Journal* 13 (2) 97-102 (1980) [12 ref. En, fr] [Dep. of Food Sci., Univ. of Guelph, Guelph, Ontario N1G 2W1, Canada]

25-kg experimental batches of Cheddar cheese were made using (i) calf rennet, (ii) 1:1 calf rennet/porcine pepsin or (iii) chicken pepsin as coagulating agent. Estimates of protein N in whey indicated that yields of cheese would be significantly lower when made with (ii) or (iii) than with (i). Compositional values for cheeses made with (i)-(iii) resp. were: moisture, 32.14, 33.02 and 32.65%; fat, 37.27, 37.18 and 33.67%; and protein, 24.15, 23.73 and 24.33%. Cheese made with (iii) contained nearly twice as much acid-soluble N ( $P < 0.05$ ) at both 3 wk and 3 months than did the other cheeses, and lacked firmness, probably due to a looser protein network; it had a very bitter flavour at 3 months. The commercial chicken pepsin used in these studies was considered to be unsuitable for Cheddar cheese production, possibly due to the presence of impurities. CDP

## 156

Cysteamine induced changes in the properties of intramuscular collagen and its relation to the tenderness of meat obtained from mature chickens.  
Sekoguchi, S.; Nakamura, R.; Sato, Y.

*Poultry Science* 58 (5) 1213-1223 (1979) [45 ref. En] [Lab. of Food Sci. & Tech. (Anim. Products), Fac. of Agric., Nagoya Univ., Chikusa-ku, Nagoya, 464 Japan]

12 White Leghorn hens, 1.5 yr of age at the start of the experiment, were used in a study on effects of administration of a diet containing 0.1% cysteamine for 35 days on characteristics of intramuscular collagen from the *pectoralis superficialis* and *biceps femoris* muscles. Tenderness of the muscles was determined by a shear press method, total collagen was determined, and physicochemical properties, amino acid composition and ultrastructure of the collagen were evaluated. Tables and graphs of results are given. Cysteamine improved tenderness; it increased total collagen and heat-labile collagen concn. but did not significantly influence neutral salt-soluble or acid-soluble collagen concn. The insoluble collagenous residue of muscle from cysteamine-treated birds was more susceptible to pepsin digestion than that from control samples. Cysteamine treatment increased the aldehyde group content of acid-soluble collagen; this may indicate an effect of cysteamine on intramolecular cross-linking. UV absorption spectra showed collagen from control birds to have a higher aromatic amino acid content than that from cysteamine-treated birds. It is suggested that cysteamine may enhance proteolysis of the non-helical region of collagen by an endogenous enzyme. Considerable differences between collagens from control and treated birds were also observed for specific viscosity as a function of temp., amino acid composition, and ultrastructure. AJDW

## 157

Apparatus and method for splitting poultry breasts.  
Thomas, P. R.; Cannon, W. P.; Whittington, J. T.; Steelman, J. H.; Oliver, D. C.; Adams, H. W.; Johnson, M. A. (Holly Farms Poultry Industries Inc.) *United States Patent* 4 251 901 (1981) [En]

Apparatus and method are described for receiving, positioning and clamping a chicken and severing the breast bone of the clamped chicken before releasing it while moving the chicken in a directed path of travel. AS

## 158

[Assessment of nutritive and biological value of broiler meat.]

Monkiewicz, J.

*Medycyna Weterynaryjna* 35 (11) 648-651 (1979) [30 ref. Pl, ru, en] [Inst. Hodowli & Tech. Produkcji Zwierzecej, Wydzial Zootech., AR, Wroclaw, Poland]

In tests carried out in spring and autumn, groups of Euribrid (Netherlands) chicks were reared to 8 wk of age on starter and finisher rations containing resp. 24 and 19% protein, and 50 broilers in each test were selected at random for examination. The cleaned carcasses were deboned, the depot fat was removed, and the meat was comminuted and blended for each sample. Mean values tabulated for each test include the following overall values with s.d.: DM  $31.55 \pm 2.48\%$ ; fat  $13.22 \pm 1.86\%$ ; ash  $0.97 \pm 0.12\%$ ; total protein  $17.8 \pm 1.12\%$ ; muscle protein  $14.82 \pm 1.02\%$ ; vitamin A  $78.133 \pm 50.237$  IU/100 g liver; and carotenes  $1258 \pm 328$   $\mu\text{g}/100$  g liver. Mean values with s.d. are tabulated for contents of 18 amino acids (automatic amino acid analyser) divided into essential and non-essential. Calculated chemical score was 52.2 with S-amino acids as limiting; and Essential Amino Acid Index was 69.9. Values for contents of 13 constituent fatty acids (GLC) in depot fat are tabulated, the major ones being palmitic, oleic and linoleic acids. 0.54% erucic acid was detected in the spring test; its presence is ascribed to inclusion of rapeseed oil in the ration; after its omission, no erucic acid was detected in the autumn test. SKK

## 159

[Evaluation of processing, hygiene and organoleptic value of broiler meat.]

Monkiewicz, J.

*Medycyna Weterynaryjna* 36 (3) 150-152 (1980) [32 ref. Pl, ru, en] [Inst. Hodowli & Tech. Produkcji Zwierzecej, Wydzial Zootech., AR, Warsaw, Poland]

In continuation of the tests described in the preceding abstr., the following mean values were found for the ground broiler meat samples: water binding capacity by the method of Grau & Hamm [*Fleischwirtschaft* (1952) No. 12, 295],  $24.62 \text{ cm}^2$  (area of pressed exudate from 300-mg sample); myoglobin, 33.46 p.p.m.; total pigments, 39.34 p.p.m.; pH 5.67; and connective tissue, 2.21%. Contents of free amino acids were determined as a measure of freshness by automatic amino acid analyser; no methionine or threonine were detected to

indicate incipient spoilage; lysine, histidine and glutamic acid were present at 308, 169 and 124 mg/100 g protein, resp. In organoleptic assessment of canned 'chicken in broth' prepared from 20 broiler carcasses from the spring and autumn experiments, involving colour, aroma, taste and tenderness, the highest marks were given for taste. SKK

## 160

### Newcomers liven up the fried chicken market.

Anon.

*Fast Food* Dec./Jan., 61, 63, 65 (1979/1980) [En]

In the US Kentucky Fried Chicken has 85% volume share of the US fried chicken market, but new operations particularly Tom Sawyer units are developing a new style chicken operation. A description is given of the Tom Sawyer operation which provides an up-scale fast service fried chicken unit offering a dinner-house environment at fast food prices. The unit incorporates stylish interior design, a drive-through window system to capture the motorists' market, a serve yourself salad bar and a method of 'recycling' the main chicken entrees as soup and chicken pot pies. Details of the menu items are presented. VJG

## 161

### [Effect of infrared radiation on chicken meat.]

Uherova, R.; Smirnov, V.; Viragova, A.

*Prumysl Potravin* 31 (10) 551-555 (1980) [4 ref. Sk]

[Slovenska Vysoka Skola Tech, Chemickotech. Fak., Bratislava, Czechoslovakia]

3 groups of 6 chicken carcasses each obtained in April 1978 and similar groups obtained in Sept. 1978 from a Bratislava (Czechoslovakia) poultry factory 24 h after slaughter were examined resp. (i) uncooked, (ii) after grilling on a rotating spit at  $160^\circ \pm 5^\circ\text{C}$  to  $95^\circ\text{C}$  internal temp., and (iii) after roasting in an electric oven under (ii) temp. conditions. (i)-(iii) were deboned, homogenized on a Fimis homogenizer, thiamin and vitamin B<sub>6</sub> contents were determined by Czechoslovak Standard thiocchrome and microbiological methods resp., and DM content was determined by drying to constant wt at  $105^\circ\text{C}$ . The results are tabulated in detail. Mean values with s.d. for thiamin in April and Sept. tests resp. were (mg/100 g DM): (i)  $0.310 \pm 0$  and  $0.485 \pm 0.014$ , (ii)  $0.176 \pm 0.015$  and  $0.232 \pm 0.007$ , and (iii)  $0.172 \pm 0.010$  and  $0.234 \pm 0.002$ . Corresponding values for vitamin B<sub>6</sub> were (mg/100 g DM): (i)  $0.760 \pm 0.02$  and  $1.102 \pm 0.207$ , (ii)  $0.213 \pm 0.006$  and  $0.310 \pm 0.052$ , and (iii)  $0.205 \pm 0.014$  and  $0.343 \pm 0.021$ . % losses in comparison with (i) were 43-52 for thiamin in grilling, and 45-52 in roasting; and for vitamin B<sub>6</sub>, they were 72 and 70-73 resp. SKK

## 162

### [Identification and residue determination of the synthetic antibacterial clopidol in commercial chicken tissues.]

Omori, S.; Nakajima, S.; Hosoki, M.; Takeguchi, Y.; Kishi, N.; Kawagoe, F.; Aoki, M.; Tomidokoro, K.; Takasugi, N.

*Journal of the Food Hygienic Society of Japan*

[*Shokuhin Eiseigaku Zasshi*] 21 (2) 113-117 (1980)

[7 ref. Ja, en] [Sapporo City Inst. of Public Health,

Minami 9 Nishi 7, Chuo-ku, Sapporo, Japan]

Residues of the coccidiostat clopidol (3,5-dichloro-2,6-dimethyl-4-pyridinol) in commercial chicken tissues were investigated in Sapporo city by means of electron capture detection (ECD)-gas chromatography. The tissues were extracted with methanol and the extracts were filtered and cleaned up on alumina and anion exchange resin columns. The eluates were treated with diazomethane to obtain the methyl ether of clopidol, which was detected by ECD-gas chromatography. The compounds were detected in commercial chicken tissues at levels of 0.04 to 1.9 p.p.m. in 12 out of 31 samples. The detected substance was identified as methyl-clopidol (3,5-dichloro-4-methoxy-2,6-lutidine) by mass chromatography. Further studies seem desirable on residual clopidol in livestock products. AS

## 163

### Selenium content of Norwegian milk, eggs and meat.

Karlsen, J. T.; Norheim, G.; Froslie, A.

*Acta Agriculturae Scandinavica* 31 (2) 165-170 (1981) [30 ref. En] [Nat. Vet. Inst., Oslo, Norway]

Se content was determined in samples of Norwegian cows milk, hens eggs and various meats. Results are quoted as  $\mu\text{g/g}$ . Pooled fresh milk samples gave Se levels of 0.008-0.014 (mean 0.011) and eggs were 0.21-0.32 (0.25). In animals from the southeastern areas values were: cattle meat 0.01-0.09 (0.036); sheep meat 0.01-0.16 (0.083); pig meat 0.05-0.16 (0.092); chicken meat 0.17-0.28 (0.22); and turkey meat 0.15-0.21 (0.18). Values for Se levels in meat of other countries were also determined. Thus eggs and poultry meats are good sources of Se, and cows milk and ruminants meat are poor sources, with pork as an intermediate source. LH

## 164

### The Anderson-Baird-Parker direct plating method versus the most probable number procedure for enumerating *Escherichia coli* in meats.

Rayman, M. K.; Aris, B.

*Canadian Journal of Microbiology* 27 (1) 147-149 (1981) [6 ref. En, fr] [Bureau of Microbial Hazards, Ottawa, Ontario, Canada K1A OL2]

Enumeration of *E. coli* in foods, particularly frozen meats by 2 methods, the Anderson/Baird-Parker direct plating method (DP) and the MPN method, was compared. In 1 set of experiments *E. coli* was enumerated in naturally contaminated samples of foods kept frozen until analysis by 2 analysts. Mean  $\log_{10}$  counts for the 2 analysts were as follows: (i) pork sausage MPN 1.74, 1.70, DP 1.85, 1.80; (ii) cheese MPN 2.76, 2.74, DP 3.04, 2.95; (iii) hamburger MPN 2.68, 2.54, DP 2.89, 2.84. MPN results were significantly ( $P = 0.01$ ) lower than DP results in (ii) and (iii). MPN was also more variable than the DP method; s.d. for MPN and DP, resp., were (i) 0.219, 0.085; (ii) 0.205, 0.108; and (iii) 0.233, 0.094. A separate series of tests on frozen and thawed deboned beef, deboned chicken and chicken emulsion with high natural levels of contamination ( $\log_{10} E. coli$  counts 4-6) showed that there were no significant differences between log counts obtained using any 1 of 3 brands of membrane filters in the DP method. The DP method therefore yields higher, more precise counts than the longer MPN method, and quantitative recovery is not sensitive to brand of membrane used. DIH

## 165

Determination of mutagens, amino- $\alpha$ -carbolines in grilled foods and cigarette smoke condensate.

Matsumoto, T.; Yoshida, D.; Tomita, H.

*Cancer Letters* 12 (1/2) 105-110 (1981) [13 ref. En]  
[Centr. Res. Inst., Japan Tobacco & Salt Public Corp., 6-2, Umegaoka, Midori-ku, Yokohama, 227 Japan]

Sliced beef, chicken, onion and Chinese mushrooms, purchased from local stores, were grilled for 6, 4, 15 and 4 min resp. Amounts of 2 mutagens, 2-amino-9H-pyrido[2,3-*b*]indole (AC) and 2-amino-3-methyl-9H-pyrido[2,3-*b*]indole (MeAC) in the grilled foods and cigarette smoke condensate were determined by an analysis stream composed of HPLC and spectrofluorometer. AC (ng) and MeAC (ng) resp. found in the foods were: grilled beef, 650.8/g, 63.5/g; grilled chicken, 180.4/g, 15.1/g; grilled Chinese mushroom, 47.2/g, 5.4/g; and grilled onion, 1.5/g, not detected.

VJG

## 166

Sundried cassava root-meal in broiler diets.

Eshiett, N.; Ademosun, A. A.

*Nutrition Reports International* 22 (3) 343-352 (1980)  
[18 ref. En] [Dep. of Anim. Sci., Univ. of Ife, Ile-Ife, Nigeria]

600 Cobb broilers were reared for 14 days then fed 4 isocaloric, isonitrogenous diets containing 0, 15, 30 or 45% cassava root meal (CRM) ad lib., in 4 replicate groups for each level, up to 6 wk of age, when healthy chicks from all groups were pooled and fed 4 finishing diets with 0, 15, 30 or 45% CRM, ad lib. (such that every possible combination of starter and finisher diets was tested). Carcass measurements of the chicks were evaluated at 10 wk of age, and showed that treatment did not affect ( $P > 0.05$ ) wt. of plucked carcass, gizzard, heart, liver or pancreas, and lengths of intestine and caeca were not altered. DM, crude protein and crude fat (%) in livers were 28.08-32.26, 56.05-60.80 and 30.61-37.81, resp., and were not affected significantly by treatment. LH

## 167

Influence of selenium, vitamin E, and ethoxyquin on lipid peroxidation in muscle tissues from fowl during low temperature storage.

Combs, G. F., Jr.; Regenstein, J. M.

*Poultry Science* 59 (2) 347-351 (1980) [26 ref. En] [Dep. of Poultry Sci., Cornell Univ., Ithaca, New York 14853, USA]

Single Comb White Leghorn pullets were fed diets containing 0 or 4% peroxidized corn oil, 125 or 500 mg ethoxyquin/kg, 0 or 0.1 mg supplemental Se/kg and 0 or 16.7 IU supplemental vitamin E/kg for 24 wk. They were then slaughtered, *pectoralis* and *gastrocnemius* muscles were removed, vacuum packaged, and stored at -20°C for  $\leq 270$  days, TBA values being determined at intervals during storage. Tables of results are given. TBA values tended to be higher in *gastrocnemius* than in *pectoralis* muscle. Data for *pectoralis* muscle show a significant increase in lipid peroxidation as a result of feeding peroxidized corn oil; a significant corn oil/Se interaction in reducing lipid peroxidation was observed.

Data for *gastrocnemius* muscle showed dietary ethoxyquin or vitamin E to reduce lipid peroxidation; a significant vitamin E/Se interaction was observed. It is concluded that dietary Se and factors affecting Se status may be of value in retarding oxidative rancidity of frozen poultry products; effects are likely to be greater for dark than for light muscle. Effects of the variables studied on plasma Se and vitamin E status are also discussed. AJDW

## 168

[Accumulation of Cd in broiler tissues.] Cadmium-Aufnahme in Gewebeteilen von Masthähnchen.  
Grote, B.; Speck, J.

*Archiv für Lebensmittelhygiene* 32 (1) 24-26 (1981)  
[18 ref. De, en] [Geochemisches Inst. der Univ., Goldschmidtstrasse 1, 3400 Göttingen, Federal Republic of Germany]

Cd accumulation was monitored daily in the breast and thigh meat, liver, kidneys and bones of 50 broilers given a daily dose of 10 mg Cd for 15 days and in the eggs of laying hens given 10 mg of Cd for 7 wk, as well as in the tissues of the hens slaughtered after 7 wk. Daily Cd detn. by flameless AAS showed that Cd was rapidly absorbed into tissues, especially in liver and kidneys: highest concn. were 18 p.p.m. in kidneys, 11 p.p.m. in liver, while concn. in breast and thigh meat and bones were around 1 p.p.m. Only low concn. were observed in the eggs, i.e. 0.03 p.p.m. in yolks, 0.02 p.p.m. in whites, and 0.025 p.p.m. in shells. Cd concn. in the tissues of the broilers were unchanged 4 wk after the administration of Cd was stopped, showing that even brief exposures cause accumulation of the toxic metal in edible tissues. RM

## 169

Evaluation of brewer's dried grains in the diets of broiler chickens.

Deltoro Lopez, J.; Fernandez Carmona, J.

*Animal Feed Science and Technology* 6 (2) 179-188 (1981) [16 ref. En] [ETSI Agron., Univ. Politecnica, Valencia, Spain]

300 day-old Hubbard broiler chicks (including both males and females) were used in a 12 wk feeding trial to evaluate effects of diets with 0, 10, 20, 30 or 40% brewers' dried grains (BDG) on performance and carcass quality. Groups of broilers were slaughtered at (i) 4, (ii) 8 and (iii) 12 wk of age. Tables of data are given for dressing %, abdominal fat pad wt., digestive tract wt., carcass composition (skin, muscle and bone %), and mean composition (% protein and fat in DM). Dressing % was unaffected by diet at any age. Digestive tract wt. was only affected by diet for (i) birds, in which it increased significantly with increasing BDG level. Carcass composition was also only significantly influenced by diet in (i) birds, % bone increasing and % muscle decreasing with increasing BDG level. Meat composition was influenced by diet in (ii) and (iii) but not in (i) birds; protein content tended to increase and fat content to decrease with increasing BDG level in the diet. Abdominal fat pad wt. decreased with increasing level of BDG in the diet. AJDW

170

**Gigantic frozen fried chicken plant in full operation for Weaver.**

Anon.

*Quick Frozen Foods* 41 (11) 34-36, 38-39 (1979) [En]

A description is given of frozen fried chicken production at the new 85 000 ft<sup>2</sup> plant of Victor F. Weaver Inc., of New Holland, Pennsylvania. The company now processes > 100 000 three and a half lb chickens/day or 2 million lb/wk. The cut and cooked chicken parts are immersed in batter, breaded (if that style), fried and then conveyed into a continuous freezer. After 1 h freezing, the fried chicken product travels down the 'slip stick' toward the packing area where the fried chicken is sorted and boxed according to piece count assortment and wt. The company sales vol. is now at \$90 million. All activities, including national warehousing and delivery, are consolidated at one location. VJG

171

**Relationship of sporulation, enterotoxin formation, and spoilage during growth of *Clostridium perfringens* type A in cooked chicken.**

Craven, S. E.; Blankenship, L. C.; McDonel, J. L.

*Applied and Environmental Microbiology* 41 (5)

1184-1191 (1981) [30 ref. En] [Meat Quality Res. Unit, Richard B. Russell Agric. Res. Cent., USDA, Athens, Georgia 30613, USA]

Sporulation and enterotoxin formation were determined for 17 strains of *C. perfringens* type A in autoclaved chicken dark meat and in Duncan-Strong sporulation medium. The mean numbers of heat-resistant spores detected after 24 h at 37°C were log<sub>10</sub> 1.13 to log<sub>10</sub> 7.64/ml in Duncan-Strong medium and log<sub>10</sub> 4.93 to log<sub>10</sub> 6.59/g in chicken. Of 17 strains, 7 formed enterotoxin in Duncan-Strong culture supernatant (1.0-60 µg/ml) and 8 produced enterotoxin in chicken (0.21-24 µg/g). Additional studies with chicken were conducted with *C. perfringens* NCTC 8239. With an inoculum of 10<sup>6</sup> cells/g, >log<sub>10</sub> 7.99 vegetative cells/g were detected by 4 h in chicken at 37°C. Heat-resistant spores occurred by 4 and 6 h and enterotoxin occurred by 8 and 6 h in autoclaved chicken dark meat and barbecued chicken drumsticks, resp. Enterotoxin was detected in autoclaved dark meat after incubation at 45°C for 1.5 h followed by 37°C for 4.5 h, but not after incubation at 45°C for 1.5-8 h. With an inoculum of 10<sup>2</sup> cells/g in oven-cooked or autoclaved chicken, >log<sub>10</sub> 8.00 vegetative cells/g were detected by 6-8 h at 37°C, heat-resistant spores were detected by 8 h, and enterotoxin was detected by 12 h. A statistical analysis of odour detn. of chicken after growth of *C. perfringens* indicated that, at the 95% confidence level, the product was considered spoiled (off or unwholesome odour) by the time spores or enterotoxin were formed. AS

# TURKEYS

1

**Turkey, boneless, frozen, raw or cooked.**

**United States of America, General Services**

**Administration, Federal Supply Service**

**Federal Specification PP-T-1823B, 21pp. (1978) [En]**

[Washington, DC 20406, USA]

This specification supersedes Interim Federal Specification PP-T-001823A:1977 and covers requirements for frozen, raw or cooked boneless turkey of 3 types, i.e. raw moulded (with skin covering), raw roll (in 3 styles - tied, netted, or shrink bag); or cooked encased (without skin covering); in 2 conditions (with or without seasoning and salt); and 2 classes. AL

2

[Production and carcass characteristics of the Large White turkey.]

Leeson, S.; Summers, J. D.

*Poultry Science* 59 (6) 1237-1245 (1980) [3 ref. En]

[Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Food intake and body wt. of male and female Large White turkeys fed commercial diets were recorded each 14 days to 168 days of age. Observations are expressed as means from 4 replicate pens of each sex. At these weighing times, 5 male and 5 female turkeys housed in comparable pens were killed and numerous carcass and visceral characteristics recorded. Included were organ wt. and commercial cut-up yields. Carcass and offal samples were analysed for moisture, crude protein, and ether extractable fat. The data are presented as a base for model building and development of production oriented prediction equations. AS

3

**Positioning, holding and lifting device.**

MacRae, B. P.

**United States Patent 4 200 040 (1980) [En]**

A positioning, lifting and holding device is described primarily designed to position large fowl such as turkeys or other roast or like food products in a cooking pan or like cooking facility. The positioning device is disposed in supporting relation to the food product so as to further facilitate its easy entry into a cooking pan and removal after the cooking process. AS

4

**Specific programmed multiple development-thin layer chromatography of furazolidone in chicken, turkey, swine and bovine tissues: collaborative study.**

Heotis, J. P.; Mertz, J. L.; Herrett, R. J.; Diaz, J. R.

Hart, D. C. van; Olivard, J.

*Journal of the Association of Official Analytical Chemists* 63 (4) 720-726 (1980) [7 ref. En] [Norwich-Eaton Pharmaceuticals, Norwich, New York 13815, USA]

A specific method for assay of furazolidone at 2 ng/g was developed using programmed multiple

development-TLC (PMD-TLC) and the conversion of the drug to a fluorescent species which is quantitated by fluorodensitometry on the TLC plate. The method requires only 5 g tissue, specifies an automatic spotter for PMD-TLC, and is capable of measuring < 1 ng of drug when the fluorodensitometer is coupled with a computing integrator. This procedure requires an average of 2 man-h per sample and can be completed in 1 day. 6 laboratories collaboratively studied the method for assay of furazolidone at 2, 3 and 6 ng/g levels in chicken, turkey, swine, and bovine tissues. Tissues were fortified by each laboratory and then processed through extraction, solvent partition, PMD-TLC and fluorodensitometry. Results showed satisfactory recoveries and accuracy. Statistical comparison of the results demonstrated that 5 of the 6 laboratories obtained similar results. Higher responses from the 6th laboratory appeared to be due to an exceptional vacuum system and the use of silitated flasks. The mean drug recovery response for the tissues spiked at 2 ng/g from the 5 laboratories was  $2.2324 \text{ ng} \pm 20.2\% (\text{s.d.})$ , which at the 99.7% confidence level gives no overlap with control tissue data. The results can be expected to be repeatable within and among laboratories. AS

5

[Requirements of floor-reared turkeys for energy and protein in the feed. II. Requirements during the fattening period.] Untersuchungen über die Anforderungen von Puten in Bodenhaltung an den Energie- und Rohproteingehalt des Mischfutters. II. Bedarf während der Mastphase.

Richter, G.; Prinz, M.

*Archiv für Tierernährung* 30 (6) 519-528 (1980) [10 ref. De, en, ru] [Sektion Tierproduktion & Veterinärmed., Karl-Marx-Univ. Leipzig, DDR-6900 Jena, German Democratic Republic]

Groups of White Broad Breasted turkeys were used in a study on effects of dietary energy content (570 or 620 hen energy feed units/kg feed) and protein content (210 or 230 g/kg feed) over the period 6-16 wk of age on performance and carcass quality. Tables of results are given, including data for yields of oven-ready carcass, total edible parts, breast meat, total meat, abdominal + intestinal fat and total skin, and for DM, crude protein and crude fat contents of the carcass. Effects of dietary energy and protein levels on yields of oven-ready carcass and carcass components and tissue composition of the carcass were small. Significant differences in carcass composition between males and females were observed. [See *Archiv für Tierernährung* (1980) 30 (4) 373-380 for part I.] AJDW

6

Bacterial content of ground and comminuted turkey meat, raw and at two levels of cooking.

McKinley, G. A.

*Dissertation Abstracts International, B* 40 (11) 5191: Order no. 80-10829, 84pp. (1980) [En] [Colorado State Univ., Fort Collins, Colorado 80302, USA]

8 triplicate samples from a commercial processing plant were tested for aerobic plate count (APC), MPN of total coliforms, *Escherichia coli* and *Staphylococcus aureus* in raw samples and ones cooked at 2 levels.

*Clostridium perfringens* and *salmonellae* were determined in 42 and 24 samples resp. The APC of (i) raw ground meat averaged  $3.4 \times 10^5$  cells/g and (ii) of raw comminuted meat  $9.0 \times 10^4$  cells/g and was significantly reduced after 5 and 7 min cooking. MPN of total coliforms in (i) averaged  $2.2 \times 10^2$  cells/g and in (ii)  $6.2 \times 10^2$  cells/g; both values were reduced by cooking. MPN for *E. coli* in (i) was 12 cells/g and for (ii) was 49 cells/g, reduced by cooking except in (i) for 5 to 7 min cooking. *S. aureus* MPN ranged from <3 to 15 cells/g in (i) and <3-150 in (ii) and was reduced by cooking. *Salmonellae* were isolated from 8.3% of (i) and 12.5% of (ii) and *C. perfringens* from 50 and 55% of (i) and (ii) resp. Cooking time reduced values in both cases. LH

## 7

**Refrigeration.**

Anon.

*Food Processing Industry* 49 (583/4) 45, 47, 49-50, 53, 55, 57 (1980) [En]

This special feature describes the following: Christian Salvesen's 3 cold stores at Droitwich, Easton, and Elstree; advanced cold storage systems at Frigoscandia Kings Lynn plant; the use of Monoscrew compressors to keep turkey products cold at Bernard Matthews Ltd., Europe's largest turkey producer; the use of an insulated tunnel to surface dry and partially cool sausages; and Apollo Freight's planned cold storage expansion. VJG

## 8

**Inhibition of potential food poisoning microorganisms by sorbic acid in cooked, uncured, vacuum packaged turkey products.**

To, E. C.; Robach, M. C.

*Journal of Food Technology* 15 (5) 543-547 (1980) [7 ref. En] [Monsanto Co., 800 N. Lindbergh Boulevard, St. Louis, Missouri 63166, USA]

Vacuum packaged, oven-roasted turkey breasts and sliced turkey breast luncheon meat were prepared with and without potassium sorbate or sorbic acid. Control and treated products were inoculated with one of the following organisms: *Salmonella*, *Staphylococcus aureus*, or enteropathogenic *Escherichia coli*. The samples were vacuum packed and stored at 15°C for 10 days. Addition of 0.25% sorbate to the breasts and 0.12% sorbic acid in the slices provided excellent protection against the growth of *Salmonella*, *E. coli*, and *S. aureus* in uncured, cooked, vacuum packaged turkey. AS

## 9

**A comparison of hospital use, food cost, nutrient value, and quality of alternate market forms of selected patient menu items.**

Franzese, R.

*Dissertation Abstracts International, B* 41 (2) 524-525: Order no. 80-17498, 277 pp. (1980) [En] [New York Univ., Washington Square, New York, New York 10003, USA]

The first section of this investigation consisted of a survey of all the menu items served to patients on

normal diets in 79 hospitals in New York City. Data relating to the ways in which the foods had been prepared, packaged and portioned by the manufacturers were collected. The extent to which convenience foods were offered to the patients was also assessed; findings indicated that more convenience foods were offered at hospitals possessing centralized (rather than decentralized) systems; chilled (rather than not) food assembly; disposable (rather than reusable) serviceware; and more recently introduced food distribution systems. The second section of the investigation involved studies of the cost, nutrient value and quality of 3 forms of 25 brands of orange juice and of 3 forms of 16 brands of sliced turkey. All the brands studied were known to be offered to hospital patients. The 3 forms of orange juice were: (i) ready-to-serve, portion control; (ii) canned, bulk; (iii) frozen concentrate. The 3 forms of turkey were: (iv) ready-to-cook, bone-in, frozen breasts; (v) ready-to-serve, precooked breasts; (vi) whole, frozen turkey. Costs were highest for (i) and (iv) and lowest for (iii) and (vi). Nutrient assays (ascorbic acid and K in orange juice, protein and thiamin in turkey) revealed no significant differences between forms except for ascorbic acid which was highest in (iii) and lowest in (i). Evaluation by a taste panel resulted in highest scores for (iii) and (v). It is concluded that the cost of the products did not significantly increase with increased nutrient value and quality. JA

## 10

**[Slaughter evaluation of medium weight White Broadbreasted turkey broilers of British and Netherlands origin.]**

Faruga, A.; Siekiera, J.; Puchajda, H.

*Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Zootechnika* No. 19, 99-105 (1979) [21 ref. Pl, ru, en] [Inst. Hodowli & Tech. Produkcji Zwierzecej, AR-T, Olsztyn, Poland]

White Broadbreasted turkeys purchased as pouls from (i) Matthews Ltd. (UK) and (ii) Coolen (Netherlands) were reared by suppliers of the poultry factory in Iława (Olsztyn province, Poland) and delivered to that factory when aged 24 wk (males) or 16 wk (females). Groups of 10 (i) or (ii) males or females selected in the factory at random from males weighing resp. 9-10, >10-11 and >11-12 kg and from females weighing resp. 3.5-4.0, >4-4.5, and >4.5-5.0 kg were line-slaughtered, and the carcasses were cooled for 24 h at 4°C and laboratory-dissected by customary research methods. Mean values with s.e. and significance measures are tabulated in detail for carcass wt., slaughter yields, proportions of giblets and inedible parts, and meat, bone and fat wt. and contents of carcasses, and parts of all variants. Among the main conclusions were: in all wt. classes, proportion of meat in the carcass was higher in females than in males; in males, origin, but not wt. determined the meat proportion in the carcass, (i) being inferior in this respect and also in slaughter yield; no such differences were found in females; proportion of internal fat in the carcass was higher in (ii). SKK

## 11

[Characterization of young slaughter turkeys based on some linear carcass measurements and slaughter values.]

Faruga, A.; Puchajda, H.; Siekiera, J.; Mazanowski, A. *Zeszyty Naukowe Akademii Rolniczo-Technicznej w Olsztynie, Zootechnika* No. 20, 143-151 (1980) [13 ref. Pl., ru, en] [Inst. Hodowli & Tech. Produkcyj Zwierzecej, AR-T, Olsztyn, Poland]

Medium heavy turkey broilers imported as pouls from the firm Coolen in Netherlands were used in this study. Females were reared to 16, and males were reared to 24 wk of age. 10 male broilers each from each of 9-10, 10-11 and 11-12 kg wt. groups and 10 female broilers from each of 3.5-4.0, 4.0-4.5 and 4.5-5.0 kg wt. groups were taken at random. Breast depth, breast-bone length, breast muscle thickness, metatarsus circumference, and some bone dimensions were measured on cooled, plucked, non-eviscerated carcasses, and indices of massiveness, compactness and height of leg were calculated. After 20 h at 4°C, the carcasses were eviscerated, weighed and % proportions of thighs, shanks, skin with subcutaneous fat, meat, and bones, and meat/bone ratios and slaughter yields were determined. The results are tabulated in detail.

Slaughter yields for the wt. groups resp. were: females, 78.6, 78.5 and 75.0%; and males, 83.5, 82.1 and 82.3%. The % of breast, thighs and shanks, and meat/bone ratios were independent of wt. but differed between sexes: ranges in females rose resp.: 27.4-28.0, 13.9-14.3, 10.9-11.3, and 7.4-7.7:1; and in males, they were correspondingly 31.7-32.2, 14.9-15.9, 12.5-12.7, and 6.0-6.5:1. SKK

## 12

Vitamin B<sub>12</sub> and folic acid content of raw and cooked turkey muscle.

Molonen, B. R.; Bowers, J. A.; Dayton, A. D.

*Poultry Science* 59 (2) 303-307 (1980) [27 ref. En] [Dep. of Food & Nutr., Kansas State Univ., Manhattan, Kansas 66506, USA]

Raw and cooked turkey *pectoralis major* muscle was assayed for vitamin B<sub>12</sub> and folic acid. Total cooking loss was greater for meat roasted at 93°C than for other cooking treatments. Moisture content of raw meat was higher than that of cooked meat; braised meat contained more moisture than roasted meat. Meat roasted at 93°C had more vitamin B<sub>12</sub> (edible wt basis) than that roasted at 177°C. On a moisture-free and fat-free basis, meat cooked at 177°C had less vitamin B<sub>12</sub> than raw meat or that cooked at 93°C. Folic acid content was not affected by the cooking treatment. AS

## 13

Manufacture and evaluation of a fabricated turkey bacon.

Baumgart, P. J.; Verstrate, J. A.; Spencer, J. V.

*Poultry Science* 59 (8) 1783-1787 (1980) [4 ref. En] [Dep. of Food Sci. & Tech., Washington State Univ., Pullman, Washington 99164, USA]

Turkey lean meat and turkey skin were used to manufacture fabricated turkey bacon. Ground turkey skin was used at 35%, 25%, 15%, and 5% of the formulation. The % of lean was increased with

decreasing skin to keep the total skin plus meat constant at 70%. The ground lean meat and skin, isolated soy protein, and curing solution were mixed, heat processed, and sliced without the need for special processing equipment. For comparative purposes, a fabricated all pork bacon (35% lean, 35% fat) was manufactured and a commercial pork bacon was purchased. Sensory evaluation panels were conducted 3 days after manufacture and again after 3 wk of refrigerated storage. Turkey bacons with 25% and 15% skin received more favourable ratings on all evaluated factors than did the other 2 turkey formulations. All of the fabricated turkey bacons were comparable in acceptability to the commercial and fabricated pork bacons. 3 wk storage did not decrease acceptability of the products. Cooking yields of all turkey formulations were significantly greater than for the commercial bacon. Cooking yields for the turkey bacons with 25%, 15%, and 5% skin were significantly greater than the yield for the fabricated pork bacon. AS

## 14

-Characteristics of bone particles from various poultry meat products.

Froning, G. W.

*Poultry Science* 58 (4) 1001-1003 (1979) [4 ref. En] [Anim. Sci. Dep., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

Bone particles were isolated from hand deboned turkey meat, sawed turkey carcasses, and mechanically deboned turkey meat. The turkey meat was solubilized by digestion with papain and the bone separated from other non-digestible material using a carbon tetrachloride:acetone mixture. Bone meal was also utilized in this study for comparative purposes. Photomicrographs were taken of isolated bone particles to determine their characteristics and size. The largest bone particles were separated from hand-deboned turkey meat (average diam. 513 µm). Bone particles from mechanically deboned turkey meat (average diam. 233 µm) were substantially smaller than those observed from hand deboned sources. Bone meal was observed to have the smallest average particle size (average diam. 83 µm). Particles from sawed carcasses were similar in size to those found in mechanically deboned turkey meat. Photomicrographs indicated that particles were generally amorphous in nature. AS

## 15

[Turkey meat and meat products.] Putensleisch und Putenfleischerzeugnisse.

Müller, -.

*Fleischwirtschaft* 60 (12) 2129 (1980) [1 ref. De]

[Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

In answer to a reader's question, the author quotes a procedure for producing smoked turkey [from *Feinkostwirtschaft* (1967) 4, 389-391] for hot or cold consumption, and recipes for meat products made with turkey (Brühwurst, Kochwurst). RM

## 16

**Effects of method of processing and chilling of turkey carcasses on processing losses, water absorption and yields.**

Salmon, R. E.

*British Poultry Science* 21 (4) 253-256 (1980) [7 ref.

En] [Res. Sta., Res. Branch, Agric. Canada, Swift

Current, Saskatchewan S9H 3X2, Canada]

The effects of wet or dry plucking, wet or dry evisceration procedures and method of chilling on processing losses and water uptake during chilling were studied using 19-wk-old female Large White turkeys.

Dry plucking increased wt. loss due to plucking and eviscerating, and reduced chilled carcass yield. Dry eviscerating increased carcass water uptake during chilling. Pre-chilling with running water increased carcass water uptake compared with chilling in ice and water alone. Water uptake during chilling appeared to be increased by longer eviscerating time. AS

## 17

**Studies on some characters of meat production of local turkey in North Iraq. II. Studies on some carcass traits.**

Riad, S. A.; El-Zugagi, R.; Yahya, N. S.

*Annals of Agricultural Science, Moshtohor* 12, 287-303 (1980) [16 ref. En, ar] [Dep. of Anim. Production, Fac. of Agric., Cairo Univ., Cairo, Egypt]

Turkeys representing birds from 3 regions of Iraq (Sulaymania, Taamim and Arbil) and 3 colour var., (white, red and black) were raised to slaughter ages of 16, 20 or 24 wk. The average dressing % was 90%; the eviscerated carcass yield was 73% and edible organs yield was 5%. Breast contributed 25-28% of the eviscerated wt., compared to 15% and 13-14% for thighs and drumsticks, resp. Meat yield from the breast, thighs and drumsticks was 80%, 80% and 75% of total wt., resp. The bone contents were 12-15%, 12-15% and 20% resp. in these carcass sections. The amount of edible material was greater in females than in males, and the regional differences ranked the birds in the order Sulaymania, Taamim, Arbil. In general results for birds of different colours were not significantly different. JRR

## 18

**Turkey ham properties on processing and cured color formation**

Acton, J. C.; Dick, R. L.; Torrence, A. K.

*Poultry Science* 58 (4) 843-847 (1979) [36 ref. En] [Dep. of Food Sci., S. Carolina Agric. Exp. Sta., Clemson Univ., Clemson, S. Carolina 29631, USA]

Turkey hams were prepared from boneless thigh meat and evaluated for yields, texture and colour development when processed in the smokehouse to internal temp. from 37.8°C to 71.1°C. Meat yields at various smokehouse temp. significantly ( $P < 0.05$ ) decreased from 96.5% at 37.8°C to 87.3% at 71.1°C. Shear values also significantly ( $P < 0.05$ ) decreased as the product temp. increased, indicating tenderness development. Microwave reheating/cooking of hams removed from the smokehouse at 48.9°, 60.0°, and 71.1°C gave final yields of approx. 85%, irrespective of

previous smokehouse cooking temp. Taste panelists scored the ham at 7.2 on a 9-point preference scale for microwave reheated, cooked hams; these scores were not affected by previous smokehouse temp. Haem pigment conversion to the nitric oxide form showed a dependence on the internal temp. of the product during heating, typical of cured meat products. The Gardner a/b ratio showed the largest zone of colour development between 43°C and 49°C. Gardner + a values (for redness) were significantly ( $P < 0.05$ ) correlated with the level of nitric oxide haem pigment produced on heating the turkey hams. AS

## 19

**Effects of air at various tension levels on storage stability of mechanically deboned poultry meats.**

Jantawat, P.

*Poultry Science* 59 (8) 1788-1794 (1980) [11 ref. En]

[Food Sci. & Human Nutr. Dep., Michigan State Univ., E. Lansing, Michigan 48824, USA]

Air pressures equivalent to 0, 126, 380, and 760 mm Hg were assigned to packages of mechanically deboned chicken meat (MDCM), mechanically deboned turkey meat (MDTM), and their lipid extracts. All treated samples were stored at -18°C for up to 3 months. Changes in phospholipid polyunsaturated fatty acids (expressed as unsaturation ratio, C18:3-22:6/C16:0) and 2-thiobarbituric acid (TBA) absorption values were used to follow lipid oxidation reactions. Samples packaged under 0 mm Hg and samples packaged at 126 mm Hg showed similar losses of polyunsaturated fatty acids and comparable development of TBA reactive substances. After 1 month of storage, TBA absorption values of MDTM samples packaged under vacuum were significantly lower than those packaged 126, 380, and 760 mm Hg. Significant differences in mean unsaturation ratios were observed between the lipid extracts from MDCM and the meat itself, but not between those from the lipid extract from MDTM and turkey meat. Significant differences in TBA reactive substances were found between turkey and chicken lipids. AS

## 20

**S-nitrosocysteine as an antioxidant, color-developing, and anticlostridial agent in comminuted turkey meat.**

Kanner, J.; Juven, B. J.

*Journal of Food Science* 45 (5) 1105-1108, 1112 (1980)

[26 ref. En] [Div. of Food Tech., Agric. Res. Organization, Volcani Cent., PO Box 6, Bet Dagan 50-200, Israel]

Effects of S-nitrosocysteine (RSNO) as an inhibitor of lipid oxidation and as a colour-developing and anticlostridial agent in a comminuted turkey meat

product are reported. These effects were compared with those of nitrite on a mol. wt. basis. Similar effects were obtained by 25 p.p.m. of nitrite or the corresponding molar concn. of RSNO in colour development and inhibition of lipid oxidation in cooked cured meat stored under anaerobic conditions.

Transnitrosation between RSNO and haemproteins occurred in the meat product. Results indicate that as

21

far as the chances for nitrosamines formation are concerned, RSNO cannot be recommended as a substitute for nitrite. In a microbiological medium and in a meat product, RSNO had less anticlostridial activity than nitrite. IFT

22

**Sun Valley: getting fresher.**

Pickstaff, -.

*Frozen Foods* 33 (3) 26, 28 (1980) [En]

Developments at Sun Valley, one of Britains largest producers of chicken and turkey meat, are described. Products include dry chilled frozen poultry (i.e. frozen without added water), frozen poultry portions, and cooked poultry, poultry portions and poultry products. AL

23

[Factors affecting the slaughter age of turkeys, especially large type birds.]

Perenyi, M.

*Baromfitenyesztes es Feldolgozas* 27 (4) 161-166 (1980) [Hu] [Mezögazdasagi Föiskola, Kaposvar, Hungary]

Selection of the optimum slaughter age for turkeys is discussed, with reference to the intended use of the carcass, the proportion of various cuts, consumer preferences, and the relatively small difference in proportions of various cuts between turkey breeds. Tables and graphs of data are given for male and female turkeys of various breeds, slaughtered at 12, 14 or 20 wk of age. AJDW

24

[The SBDD plant at Pleucadeuc:  
45 000 turkeys/week.]

Anon.

*RTVA* 19 (160) 39-43 (1980) [Fr]

The Societe Bretonne de Decoupe de Dindes plant at Pleucadeuc, France is described. Aspects considered include delivery and reception of turkeys, stunning, bleeding, scalding, plucking, cleaning, neck removal, evisceration, head removal, rinsing the exterior and interior, removal of the feet and leg tendons, cooling, and packaging. AJDW

25

[Inspection and control of poultry meat supplied for institutional catering.]

Parisi, E.; Julini, M.; Saracco, M.

*Industria Alimentari* 19 (12) 948-950 (1980) [It]

[Istituto di Ispezione degli Alimenti di Origine Anim., Univ. degli studi di Torino, Turin, Italy]

The hygienic control of chicken and turkey is discussed on the basis of examination of meat and carcass samples between Sept. 1979 and Aug. 1980. Practical hints are given from the institutional caterer's viewpoint in cases of superficial or internal putrefaction, freezer burn, or bruising and bleeding of carcasses. KME

26

[Manufacture of turkey meat products using textured vegetable proteins.]

Nedjikovic, L.; Curilovic, V.; Ilic, N.

*Tehnologija Mesa* 20 (10) 295-298 (1979) [3 ref. Sh, en]

[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

15% hydrated textured vegetable protein (TVP) may be used in manufacture of shaped comminuted turkey meat products, i.e. (i) fricadelles and (ii) 'polpet', without impairment of the organoleptic properties; addition of TVP reduces the fat content of (i), but has little effect on the chemical composition of (ii). 20 or 25% TVP slightly modifies the flavour of (i) and (ii) without impairing palatability. Added TVP reduces wt. losses during heat treatment of (ii); results for (i) are inconclusive. It is concluded that high-quality turkey meat products containing TVP may be manufactured. STI

27

**Microbial quality of ground and comminuted, raw and cooked turkey meat.**

McKinley, G. A.; Avens, J. S.

*Journal of Food Protection* 44 (2) 139-143 (1981)

[25 ref. En] [Dep. of Anim. Sci., Colorado State Univ., Fort Collins, Colorado 80523, USA]

The microbial quality of ground and comminuted turkey meat was examined using raw meat and meat after 2 cooking times. 8 triplicate samples were obtained from a commercial processing plant over an 8-month period and analysed for aerobic plate count (APC), coliforms, *Escherichia coli*, *Staphylococcus aureus*, *Clostridium perfringens* and *Salmonella*. The APC for 29% of the raw ground and 0% of the raw comminuted turkey meat samples was  $> 5.0 \times 10^6$ /g. Raw ground and comminuted meat yielded a mean coliform most probable number (MPN) of  $2.2 \times 10^2$  and  $6.2 \times 10^2$ /g resp. Mean *E. coli* MPN/g were 12 for raw ground and 49 for raw comminuted meat. 25% of the 24 raw ground samples, and 46% of the comminuted samples exceeded 50 *E. coli* MPN/g. *S. aureus* was isolated from 25% of the raw ground and 54% of raw comminuted samples. *Salmonellae* were isolated from 8% of the raw ground samples and 12% of raw comminuted samples. *C. perfringens* was isolated from 50 and 55% of 40 ground and 40 comminuted meat samples, resp. Cooking reduced the microbial numbers and isolation frequency from all samples. AS

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